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Supplemental Material

Modeling Future Projections of Temperature-Related Excess Morbidity due to Infectious Gastroenteritis under Climate Change Conditions in Japan

Daisuke Onozuka, Antonio Gasparrini, Francesco Sera, Masahiro Hashizume, and Yasushi Honda

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References

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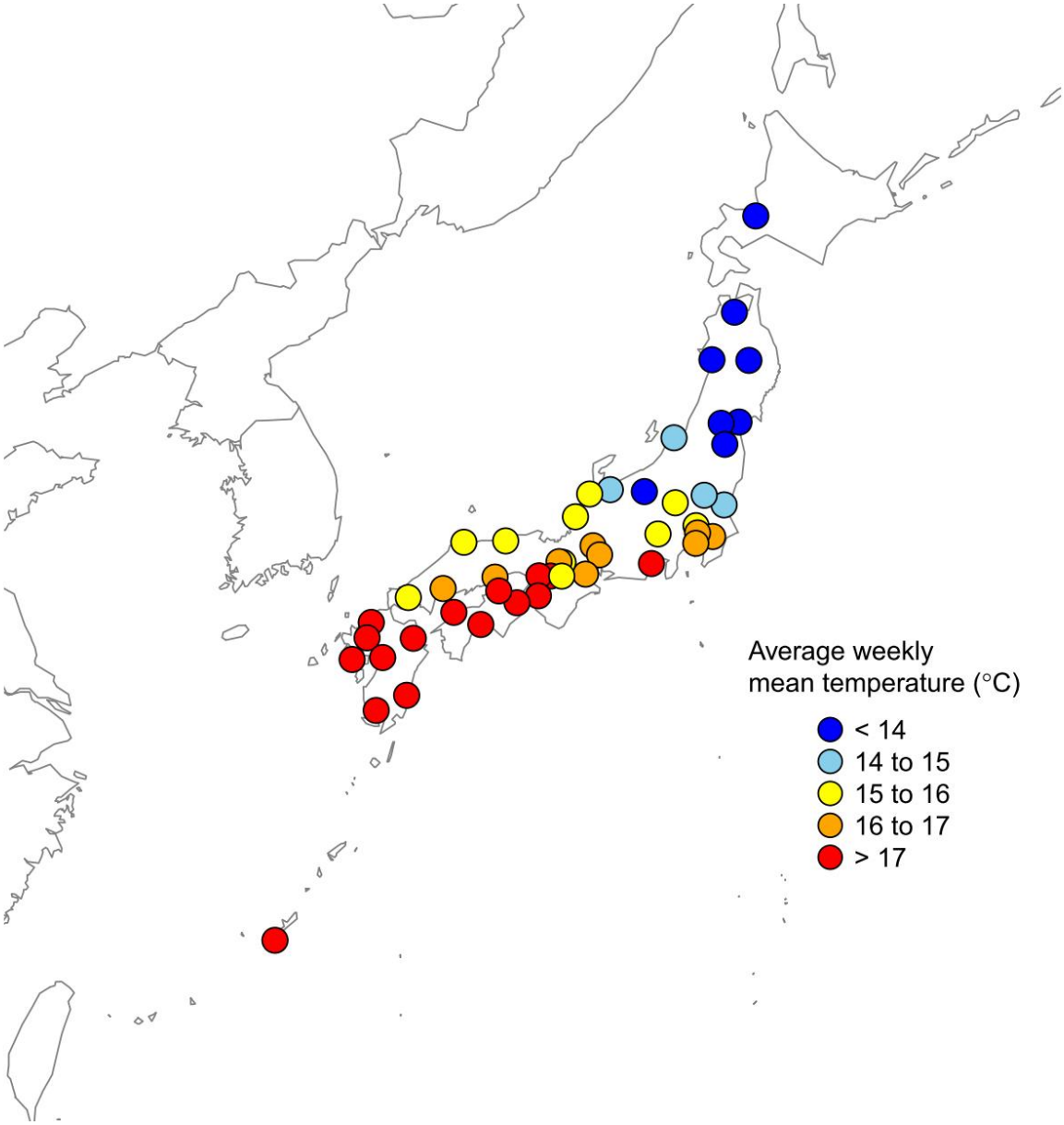

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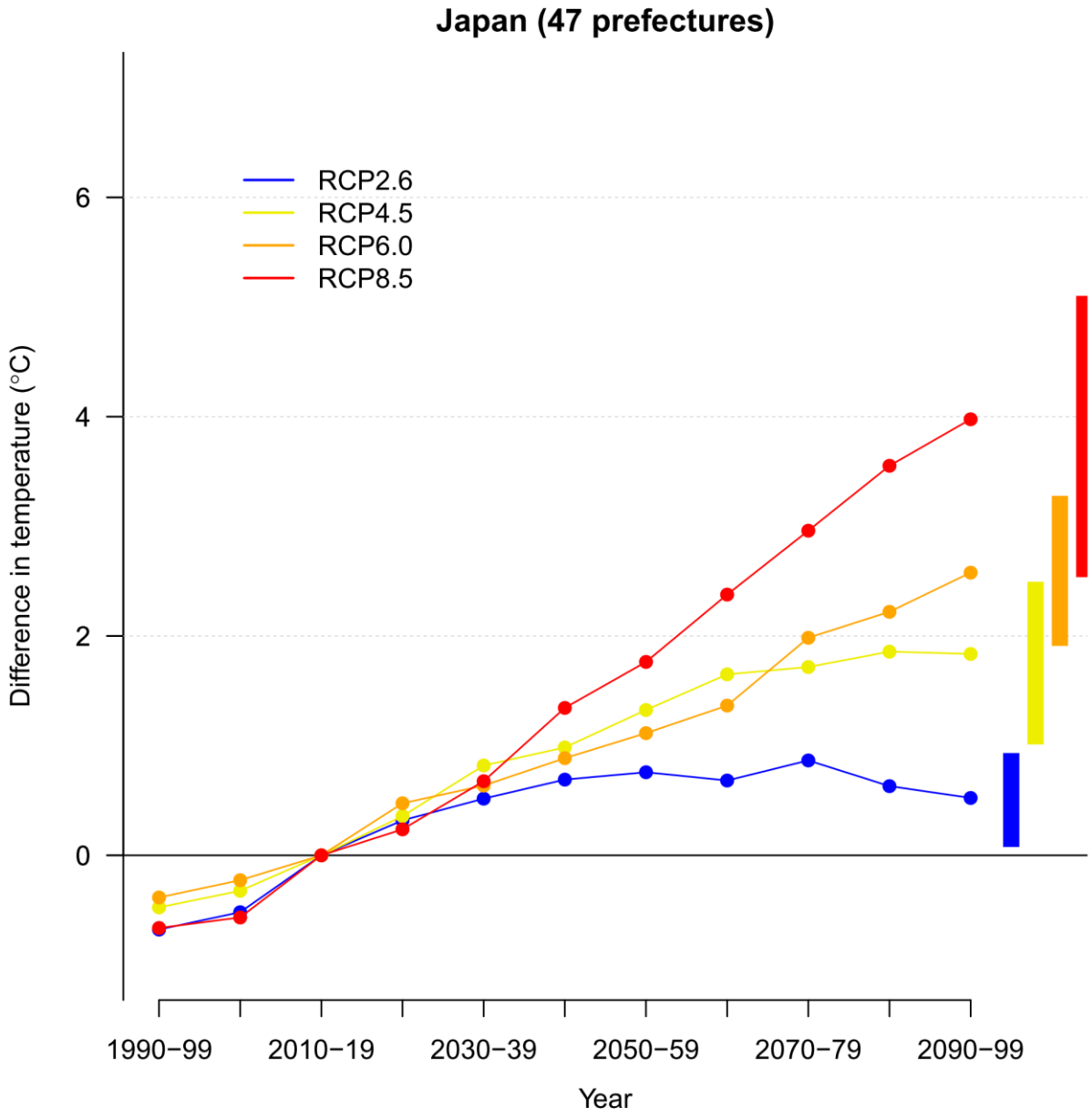

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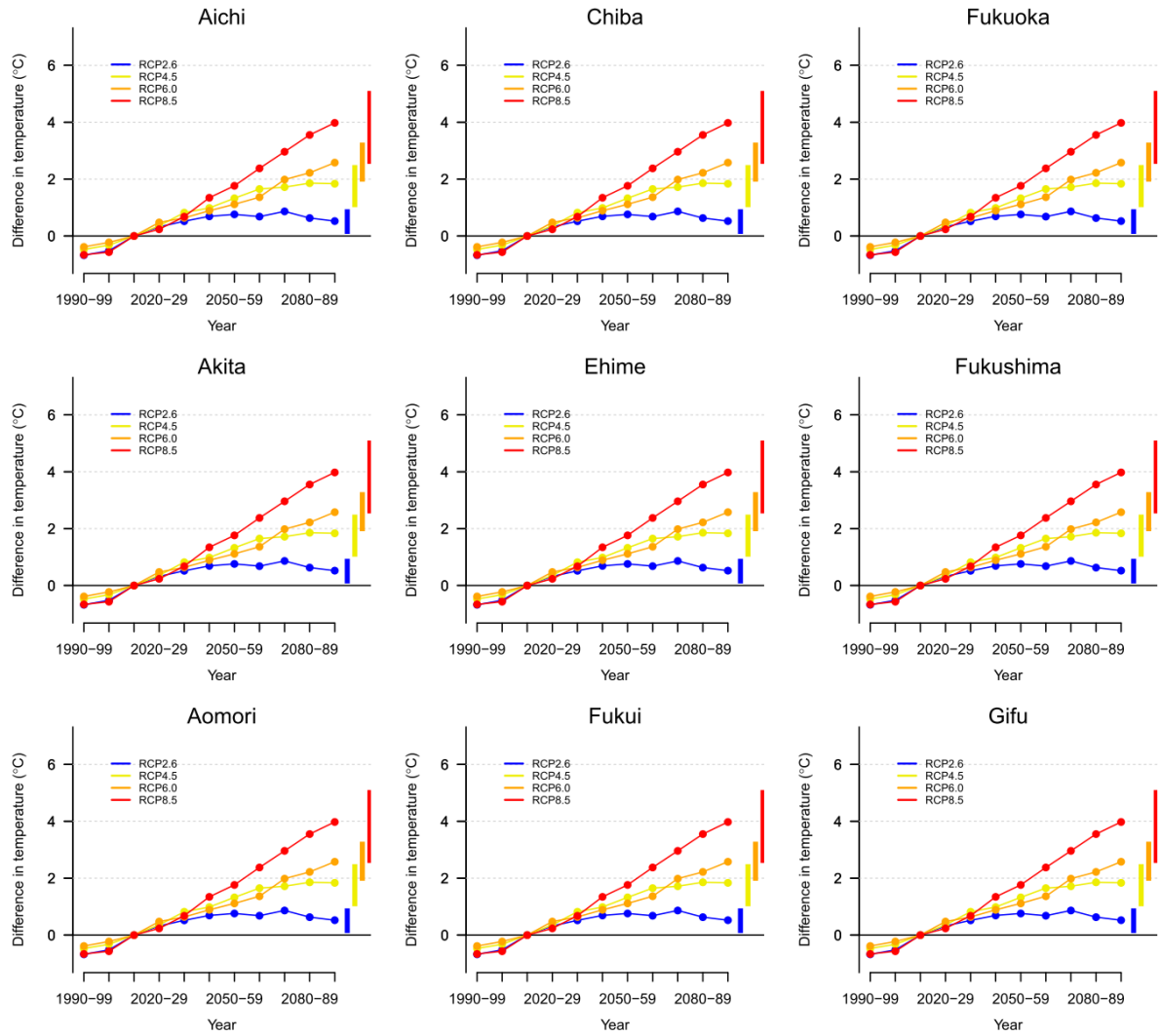
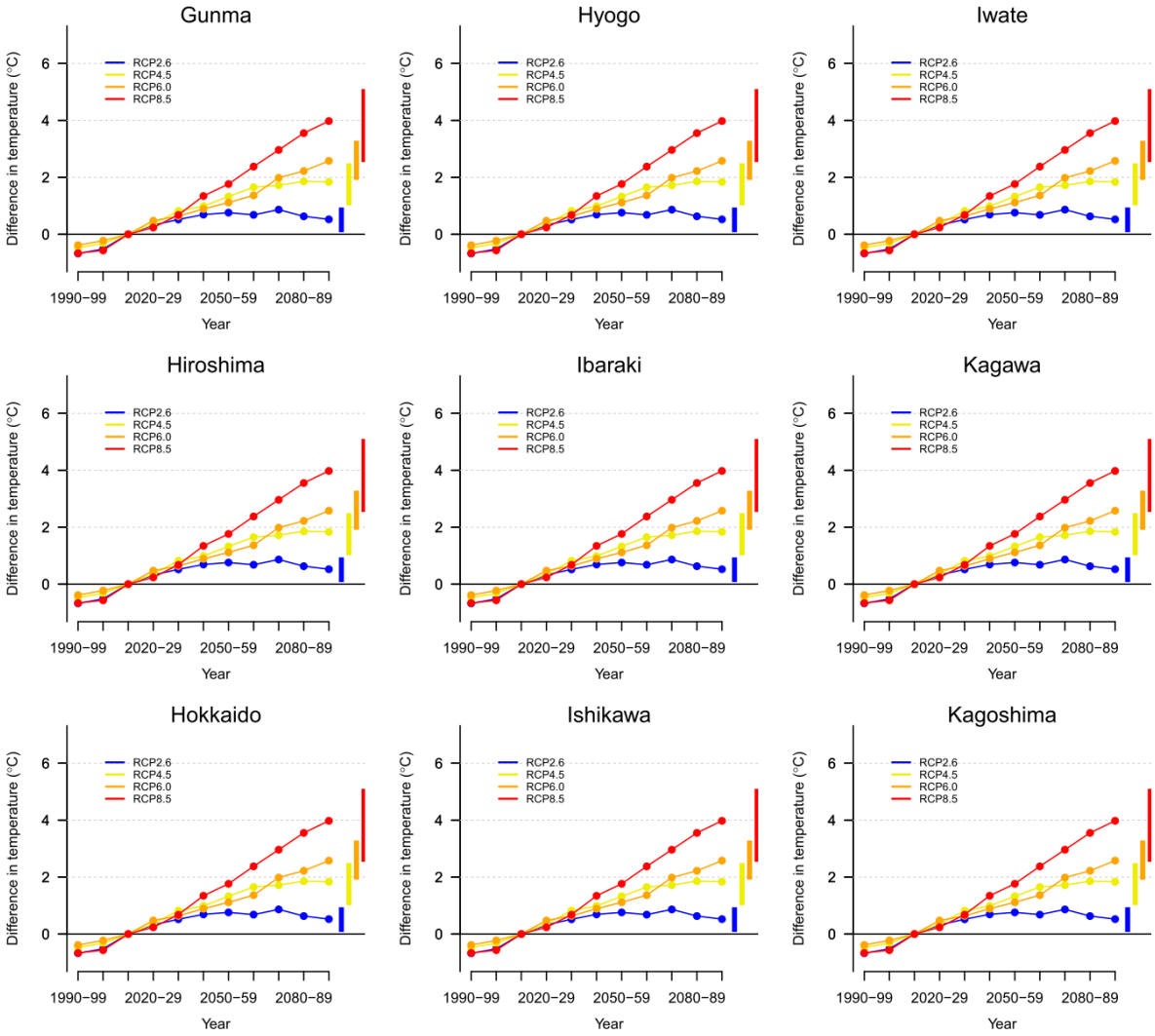
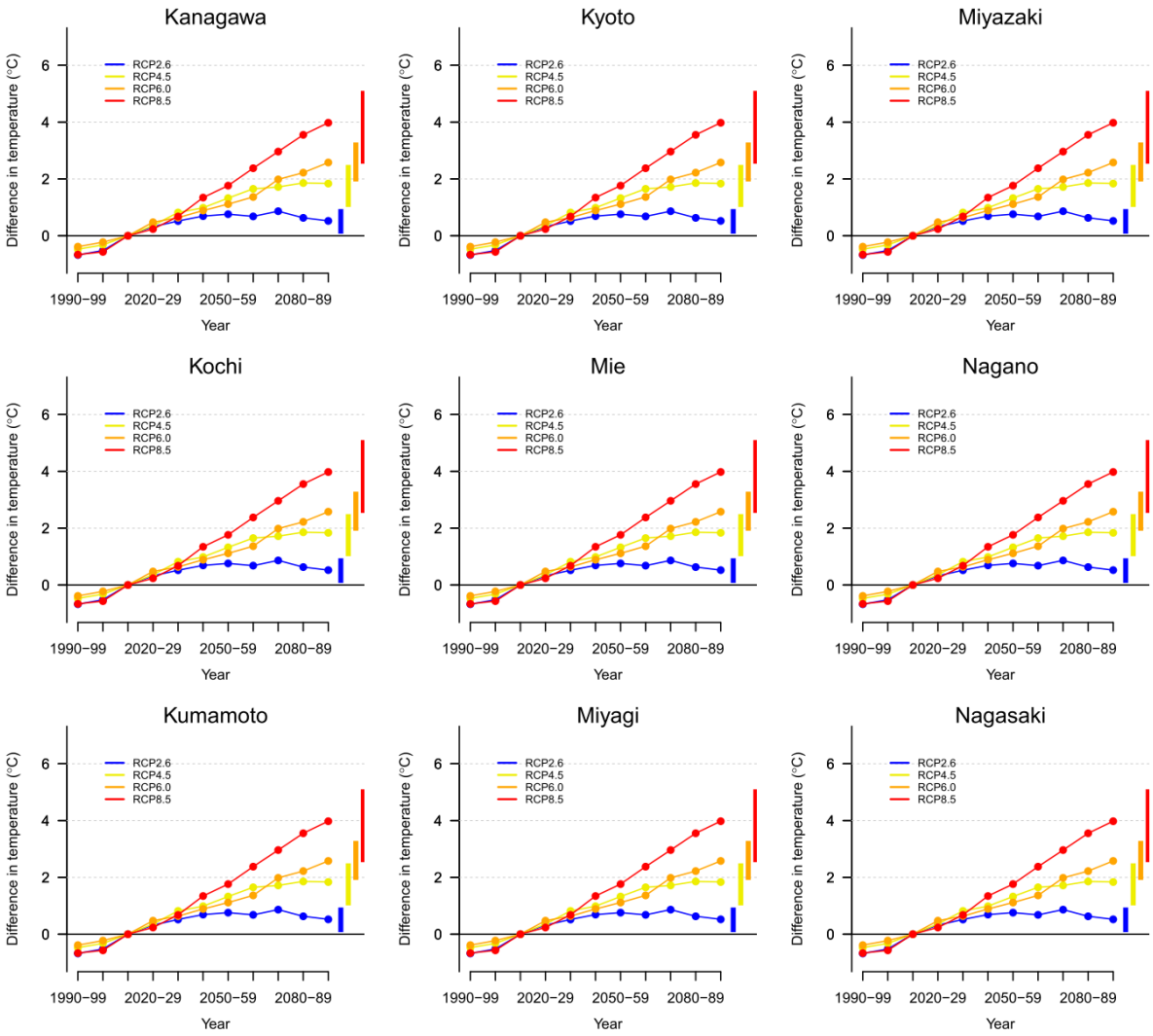
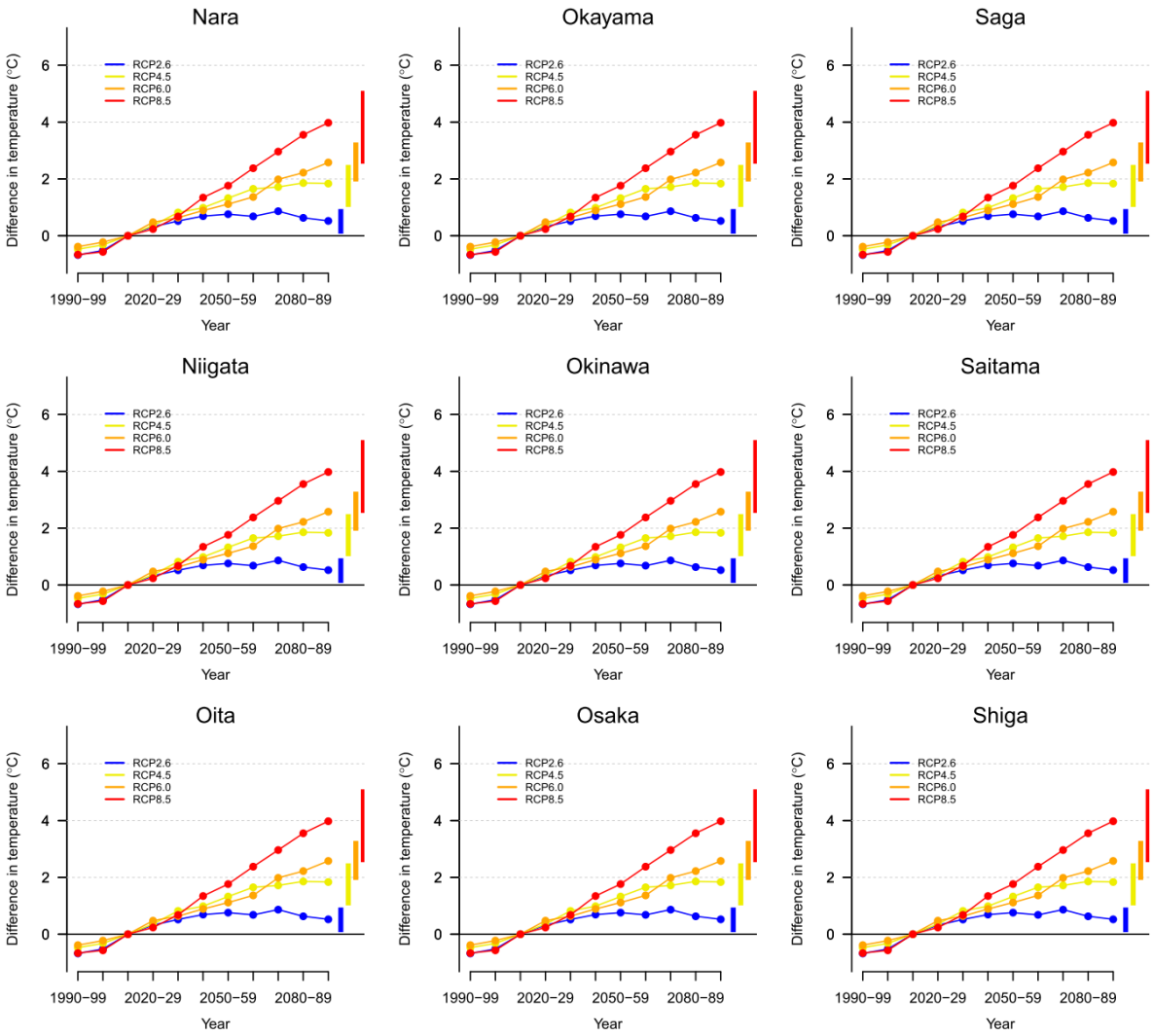
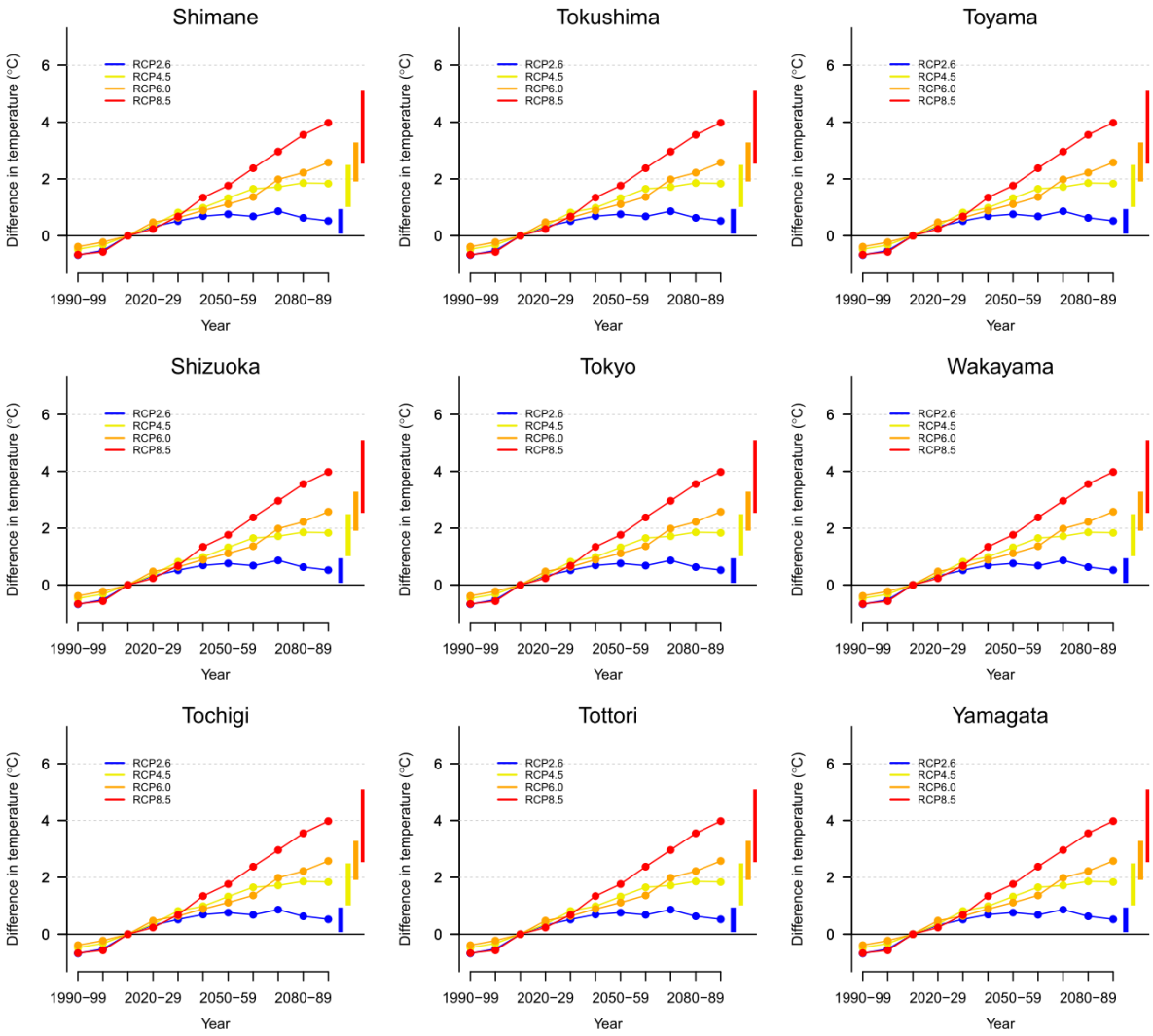
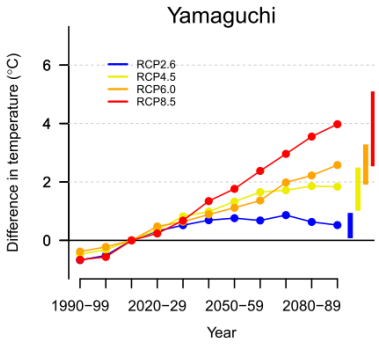



Gunma
Hyogo
Iwate
Hiroshima
Ibaraki
Kagawa
Hokkaido
Ishikawa
Kagoshima
RCP2.6
RCP4.5
RCP6.0
RCP8.5
Difference in temperature (°C)
0
2
4
6
1990–99
2020–29
2050–59
2080–89
Year


Kanagawa
Kyoto
Miyazaki
Kochi
Mie
Nagano
Kumamoto
Miyagi
Nagasaki
RCP2.6
RCP4.5
RCP6.0
RCP8.5
Difference in temperature (°C)
0
2
4
6
1990–99
2020–29
2050–59
2080–89
Year


Nara
Okayama
Saga
Niigata
Okinawa
Saitama
Oita
Osaka
Shiga
RCP2.6
RCP4.5
RCP6.0
RCP8.5
Difference in temperature (°C)
0
2
4
6
1990–99
2020–29
2050–59
2080–89
Year


Shimane
Tokushima
Toyama
Shizuoka
Tokyo
Wakayama
Tochigi
Tottori
Yamagata
RCP2.6
RCP4.5
RCP6.0
RCP8.5
Difference in temperature (°C)
0
2
4
6
1990–99
2020–29
2050–59
2080–89
Year


Yamaguchi
Difference in temperature (°C)
6
4
2
0
RCP2.6
RCP4.5
RCP6.0
RCP8.5
1990–99
2020–29
2050–59
2080–89
Year

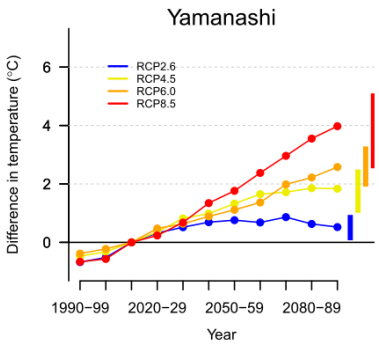
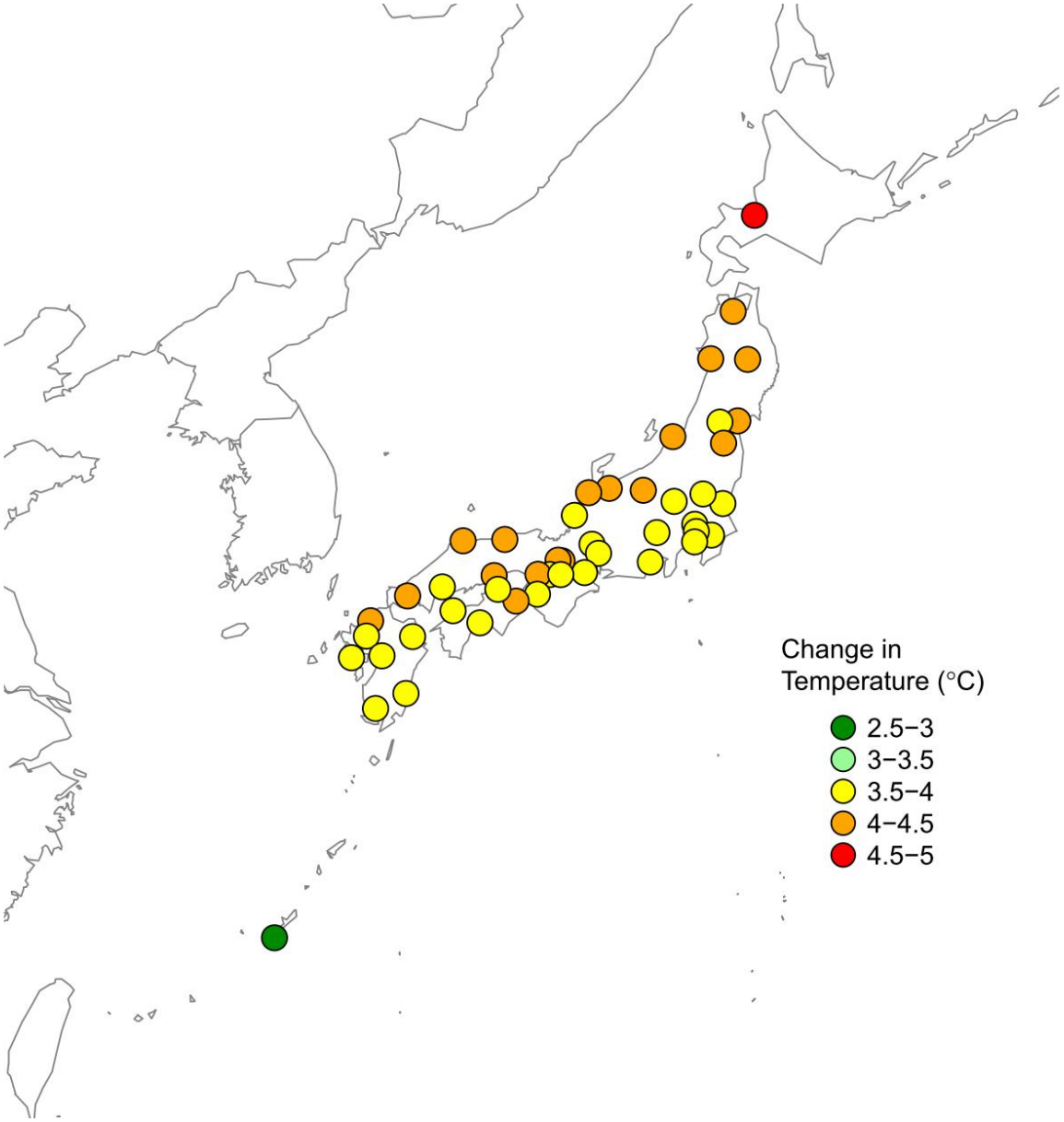

Yamanashi
Difference in temperature (°C)
6
4
2
0
RCP2.6
RCP4.5
RCP6.0
RCP8.5
1990–99
2020–29
2050–59
2080–89
Year

Figure S4. Map of prefecture-specific projected changes in temperature (°C, GCM-ensemble average) in 2090–2099 compared to 2010–2019 under RCP8.5 scenario in the 47 Japanese prefectures. GCM=general circulation model; RCP=representative concentration pathway.



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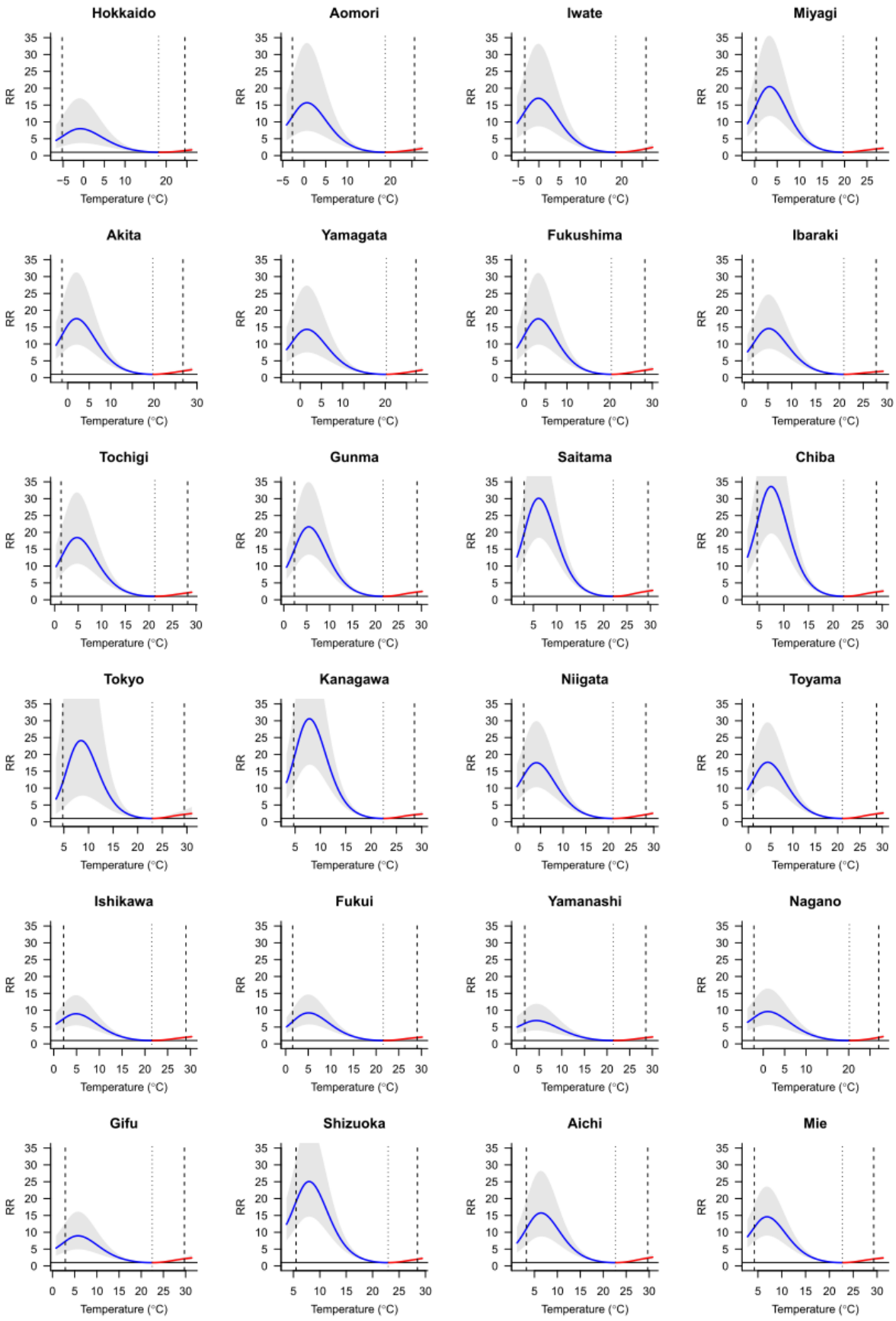
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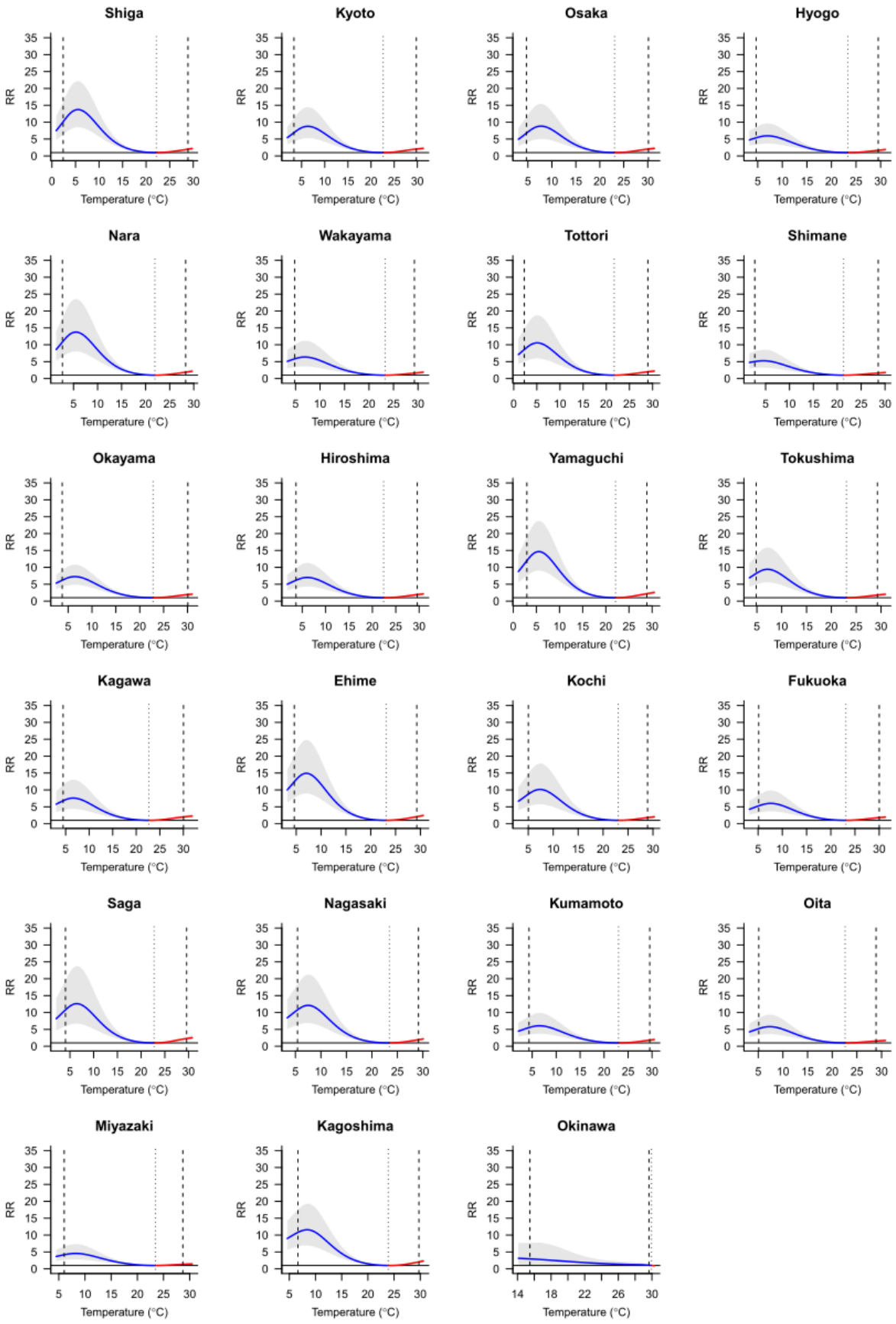
Aomori
Iwate
Miyagi
Akita
Yamagata
Fukushima
Ibaraki
Tochigi
Gunma
Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi
Mie
RR
Temperature (°C)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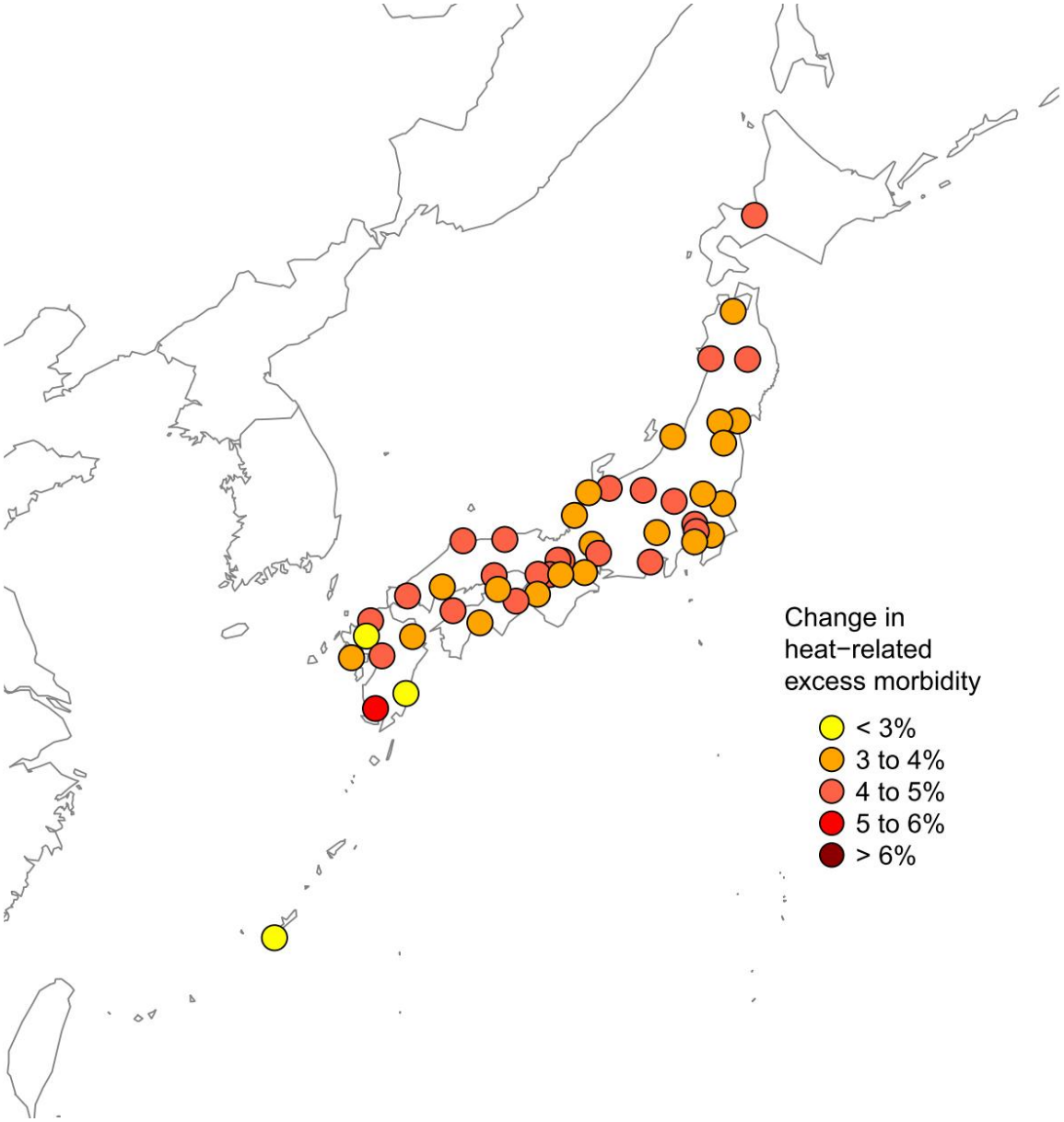
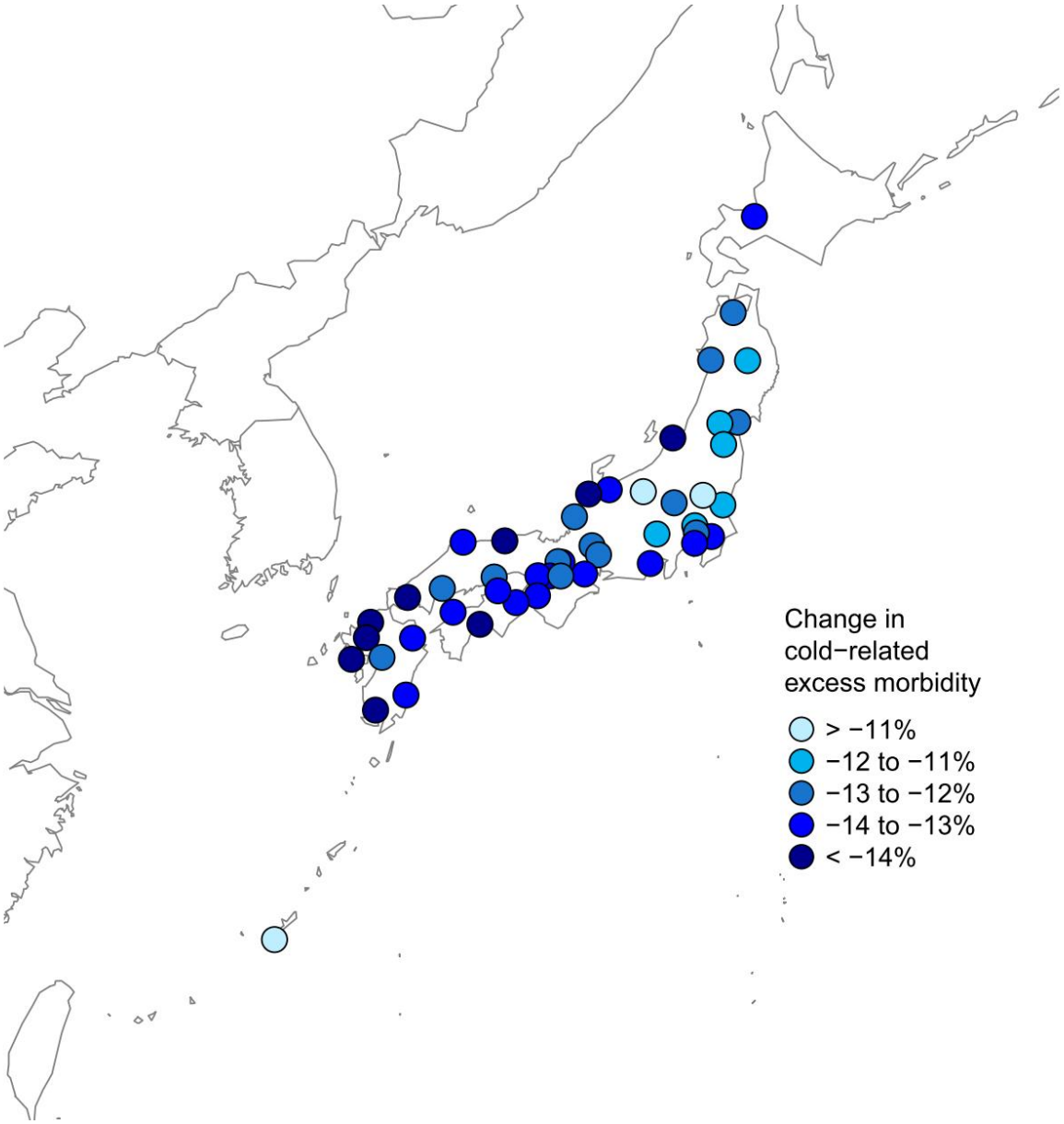
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima
Yamaguchi
Tokushima
Kagawa
Ehime
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
RR
Temperature (°C)

Figure S6. Map of prefecture-specific projected changes in heat-related, cold-related, and net excess morbidity (%) in diarrhea in 2090–2099 compared to 2010–2019 under RCP8.5 scenario in the 47 Japanese prefectures. RCP=representative concentration pathway.




Change in
cold−related
excess morbidity
> −11%
−12 to −11%
−13 to −12%
−14 to −13%
< −14%

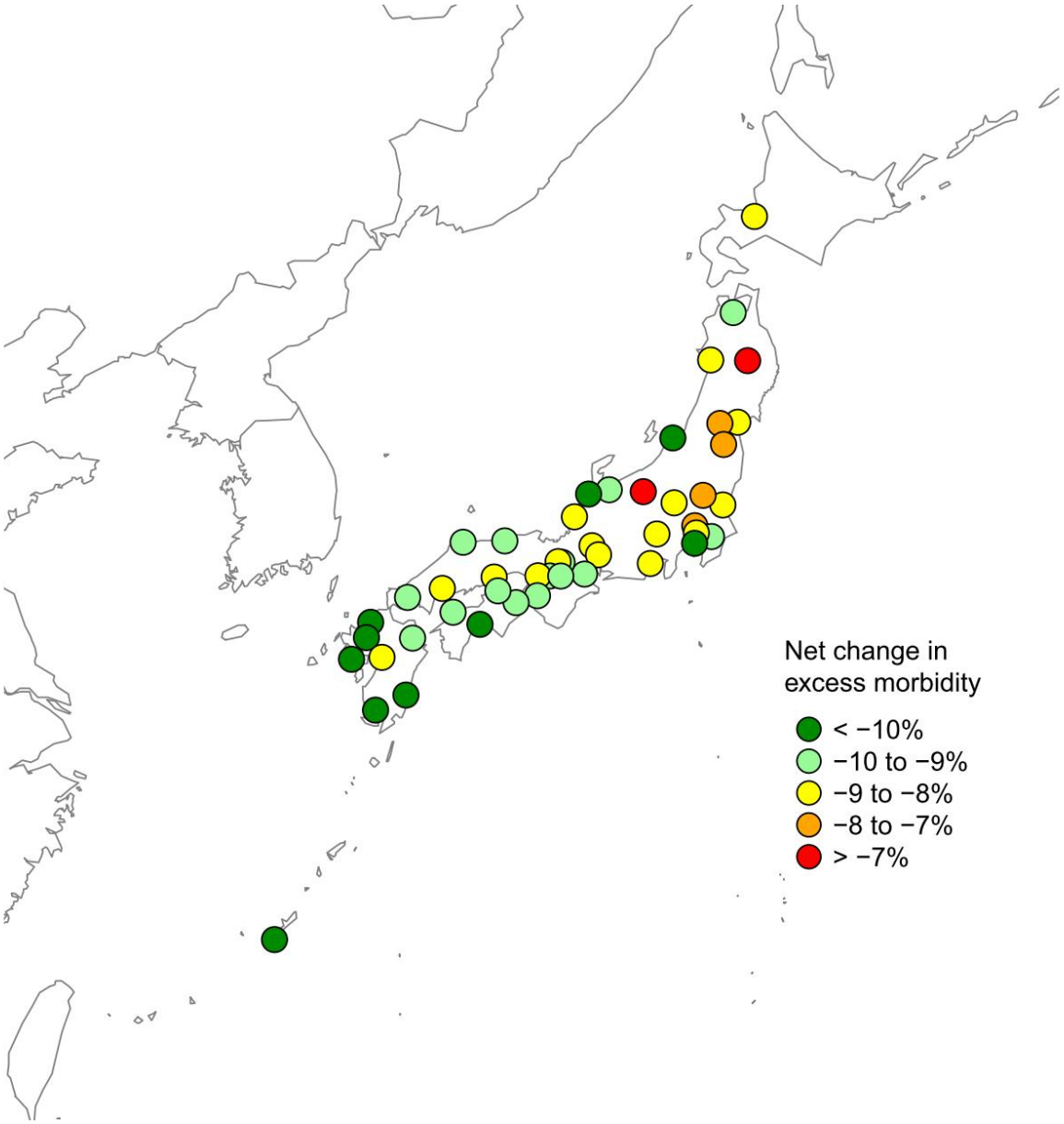
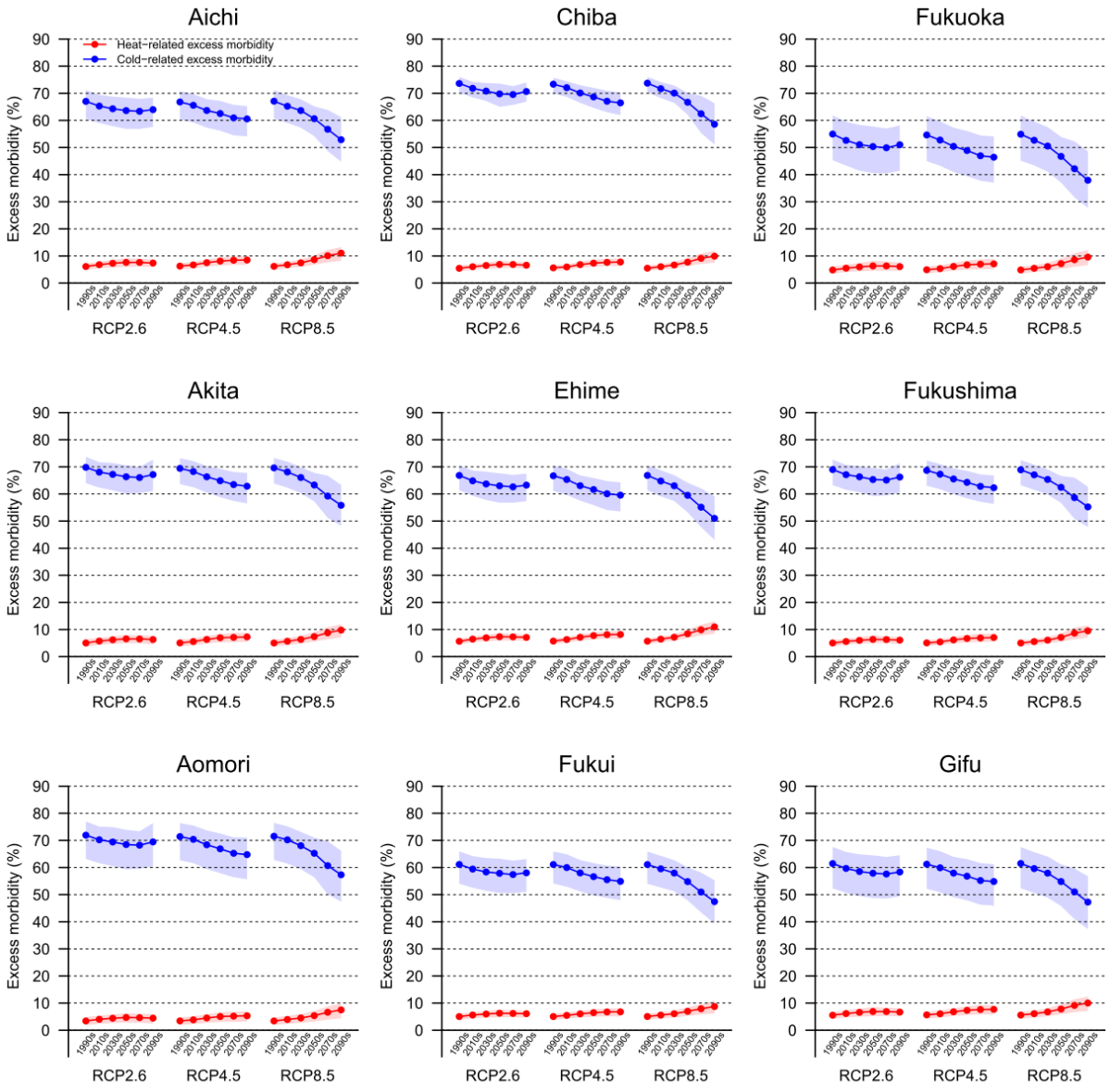
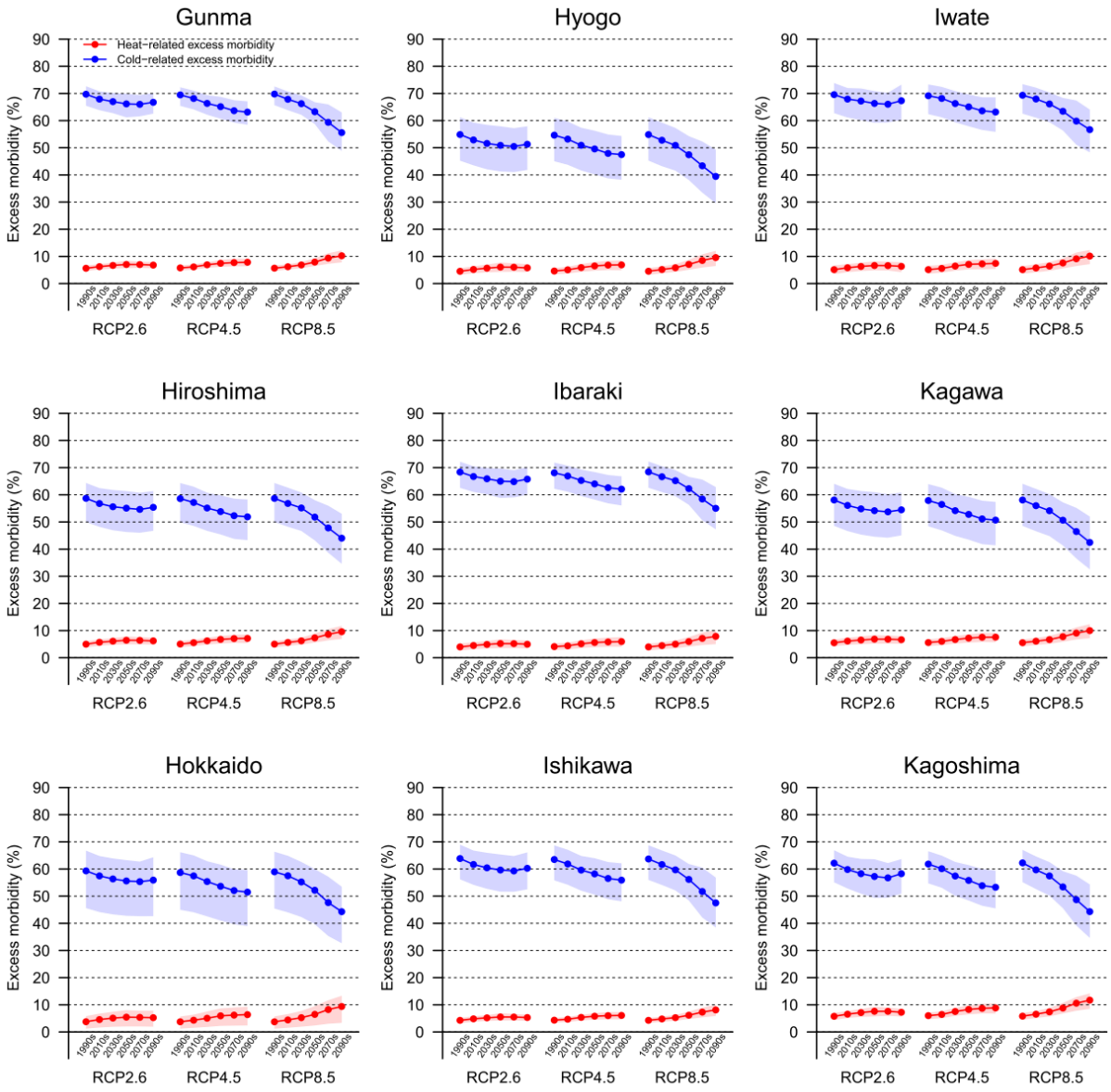
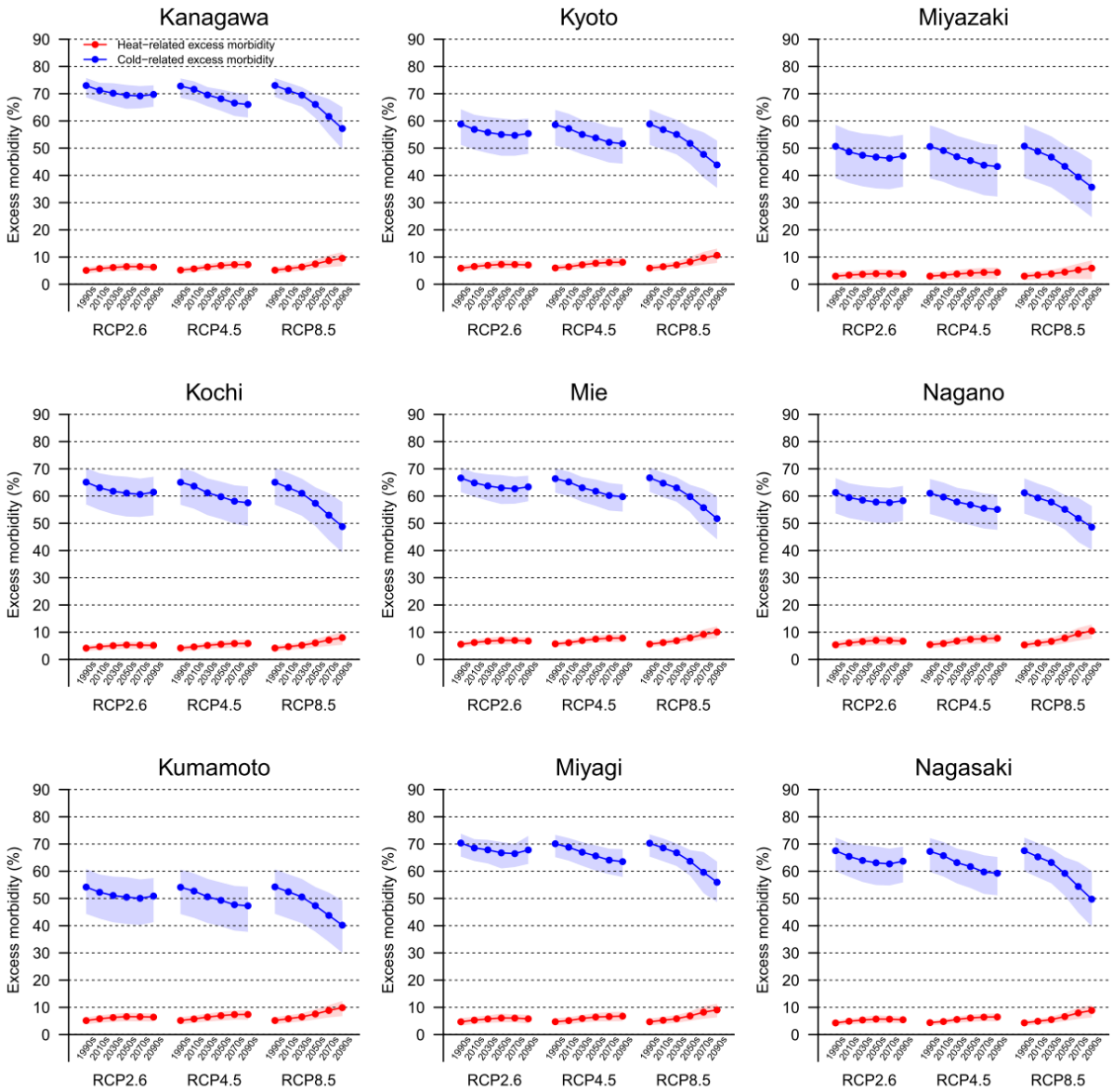

Net change in
excess morbidity
< −10%
−10 to −9%
−9 to −8%
−8 to −7%
> −7%

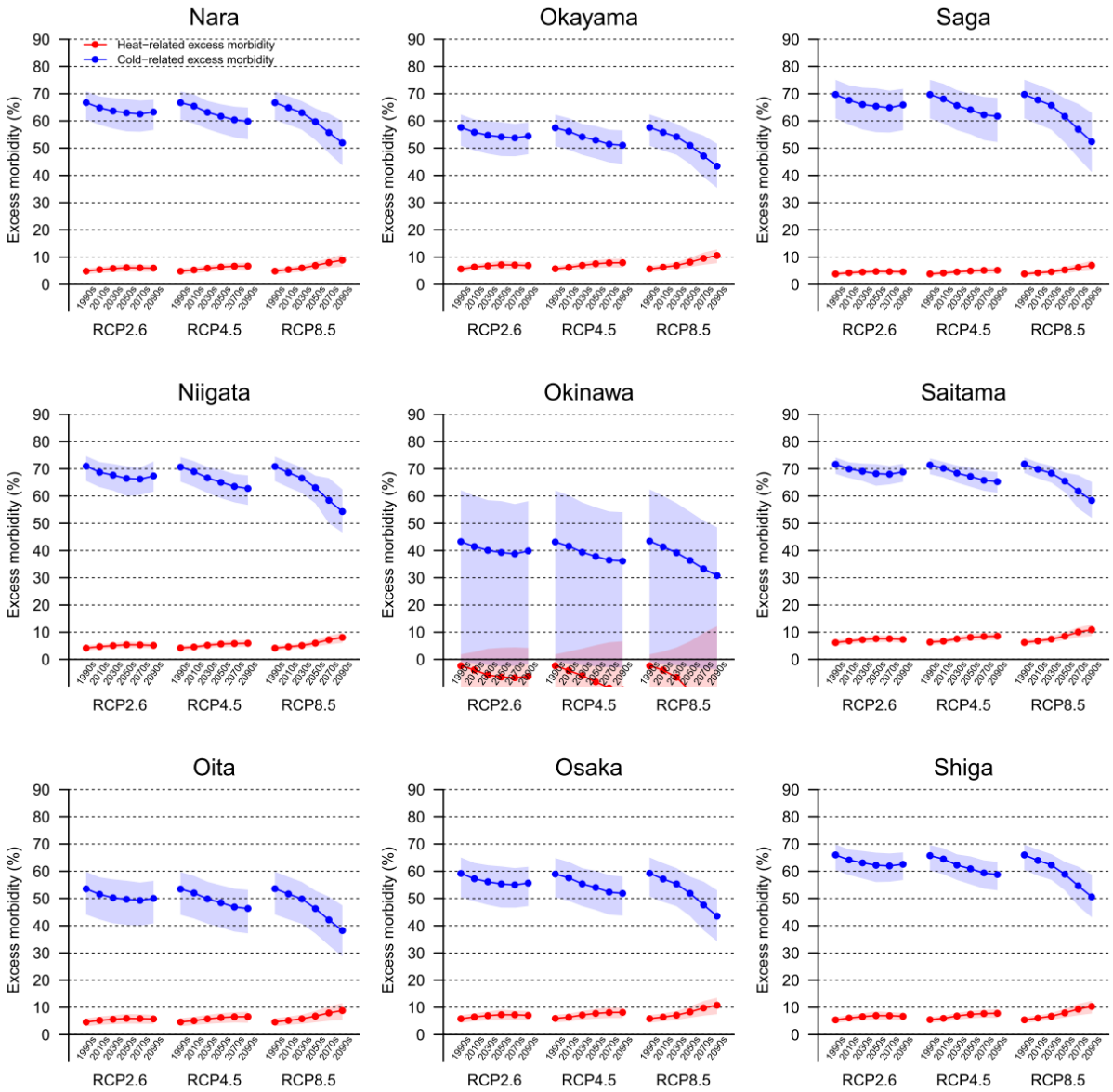
Figure S7. Trends in heat-related and cold-related excess morbidity in diarrhea by prefecture.

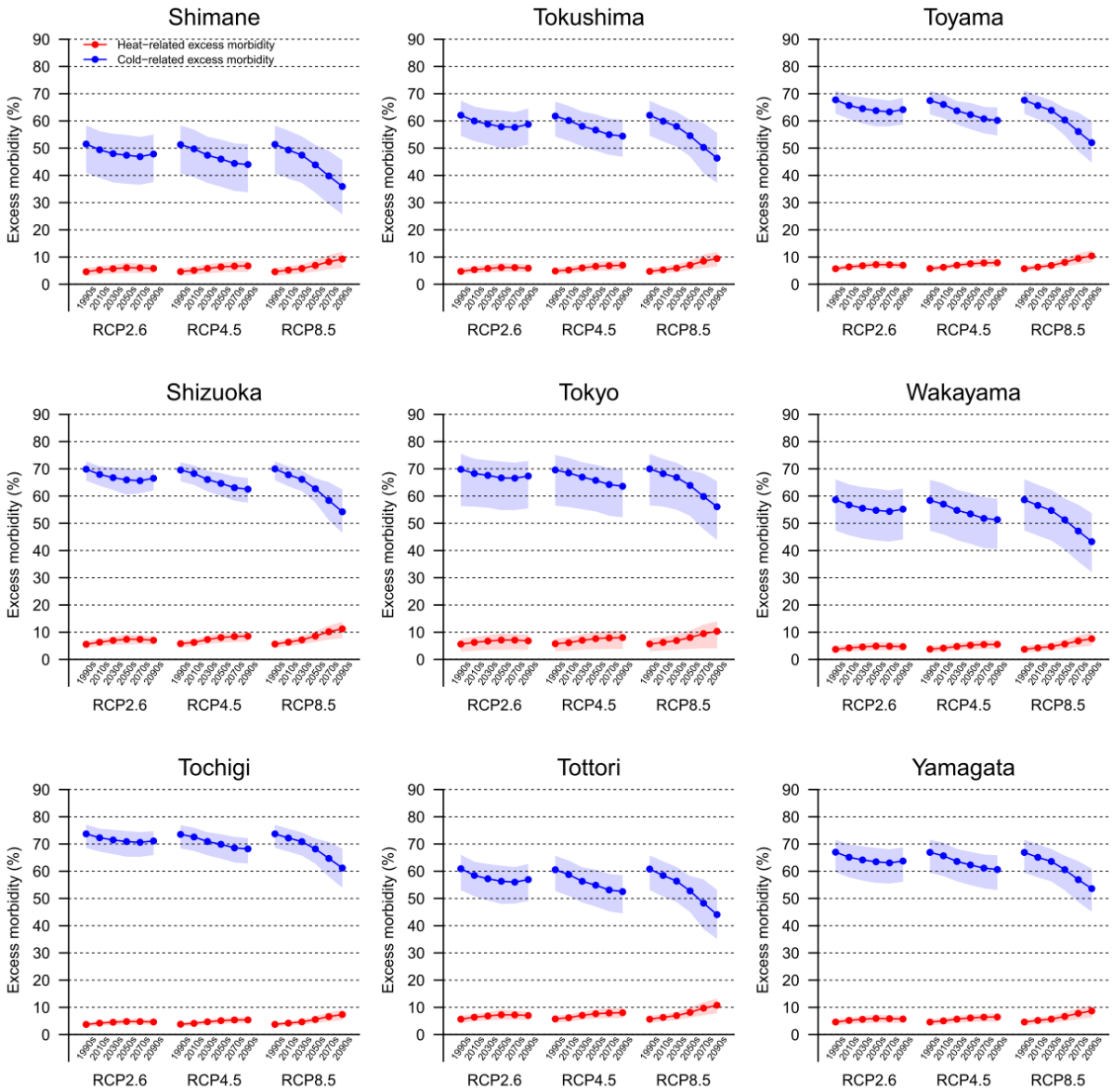
RCP=representative concentration pathway.

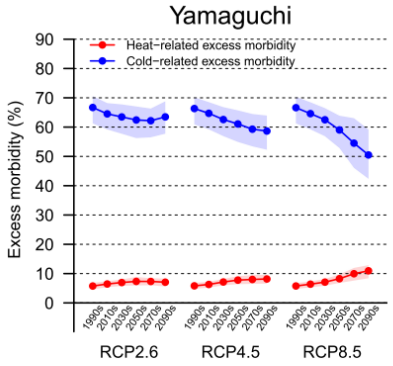



Gunma
Hyogo
Iwate
Hiroshima
Ibaraki
Kagawa
Hokkaido
Ishikawa
Kagoshima
Heat−related excess morbidity
Cold−related excess morbidity
Excess morbidity (%)
0
10
20
30
40
50
60
70
80
90
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Kanagawa
Kyoto
Miyazaki
Kochi
Mie
Nagano
Kumamoto
Miyagi
Nagasaki
Heat−related excess morbidity
Cold−related excess morbidity
Excess morbidity (%)
0
10
20
30
40
50
60
70
80
90
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Nara
Okayama
Saga
Niigata
Okinawa
Saitama
Oita
Osaka
Shiga
Heat−related excess morbidity
Cold−related excess morbidity
Excess morbidity (%)
0
10
20
30
40
50
60
70
80
90
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Shimane
Tokushima
Toyama
Shizuoka
Tokyo
Wakayama
Tochigi
Tottori
Yamagata
Heat−related excess morbidity
Cold−related excess morbidity
Excess morbidity (%)
0
10
20
30
40
50
60
70
80
90
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Yamaguchi
Heat−related excess morbidity
Cold−related excess morbidity
Excess morbidity (%)
90
80
70
60
50
40
30
20
10
0
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5

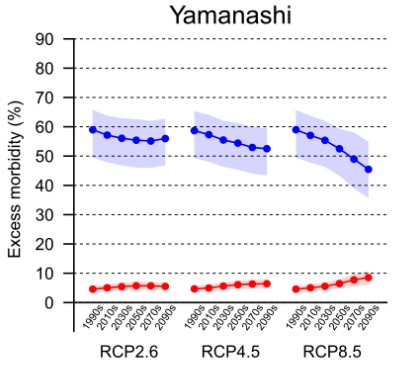
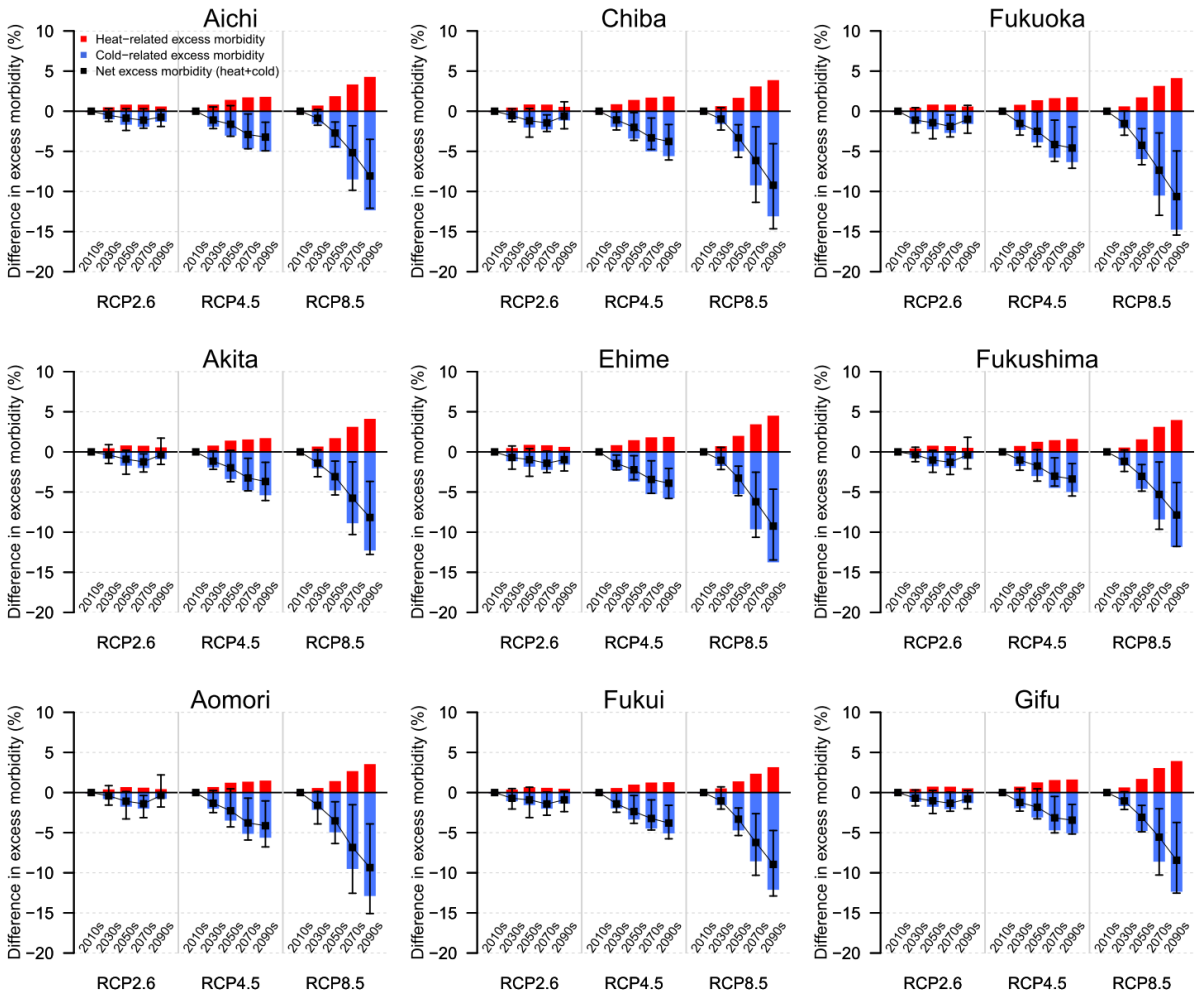
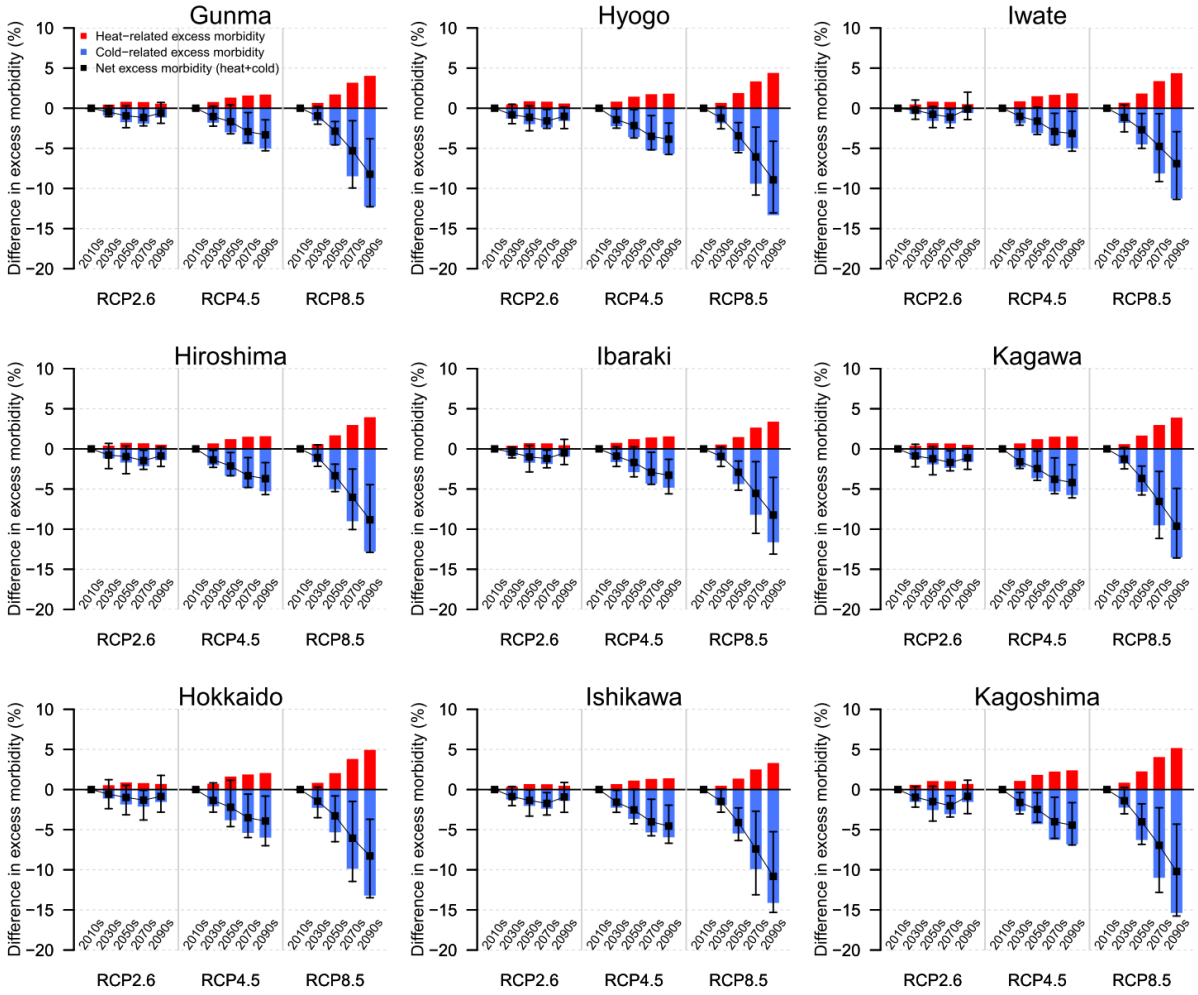
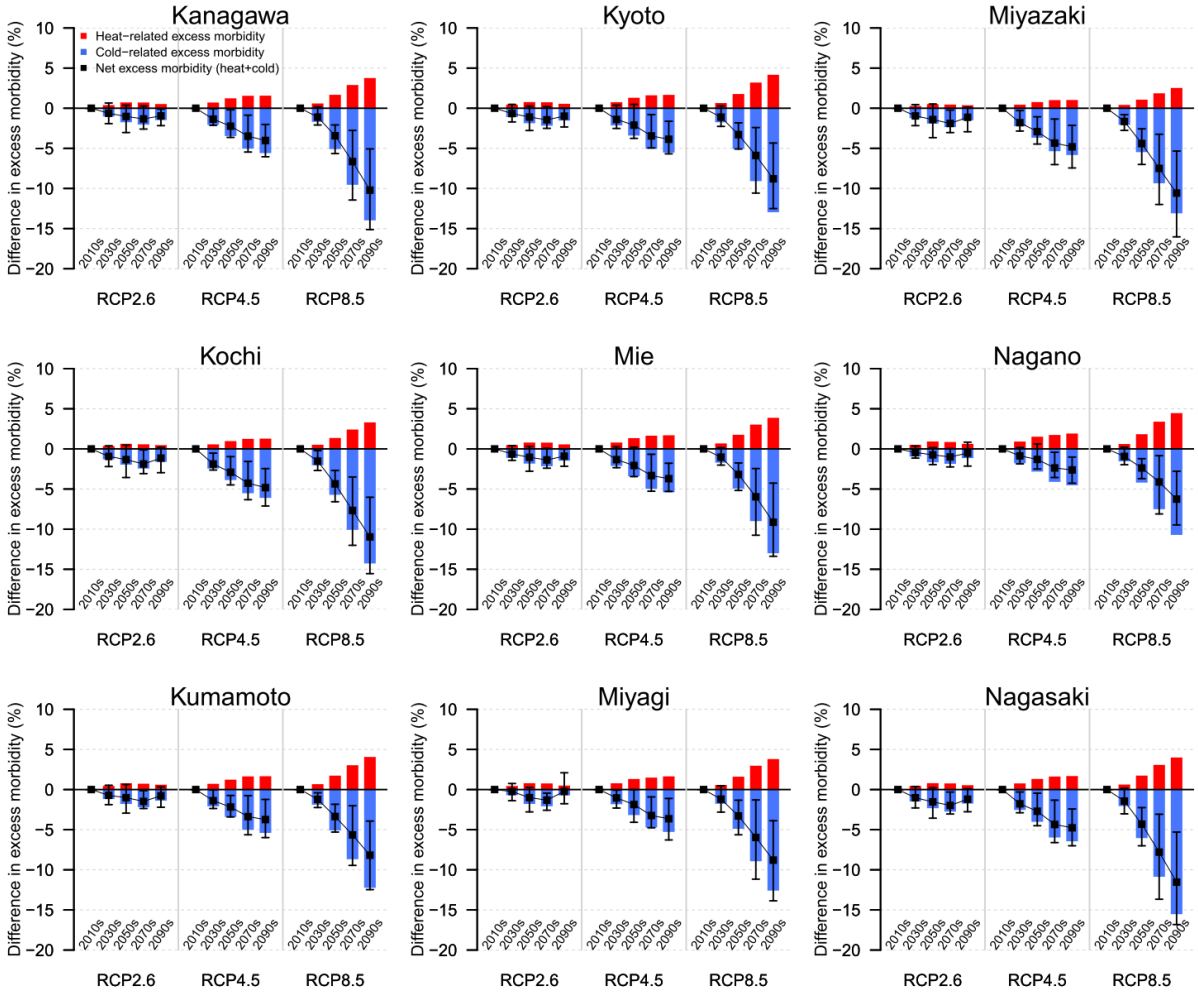

Yamanashi
Excess morbidity (%)
90
80
70
60
50
40
30
20
10
0
1990s
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5

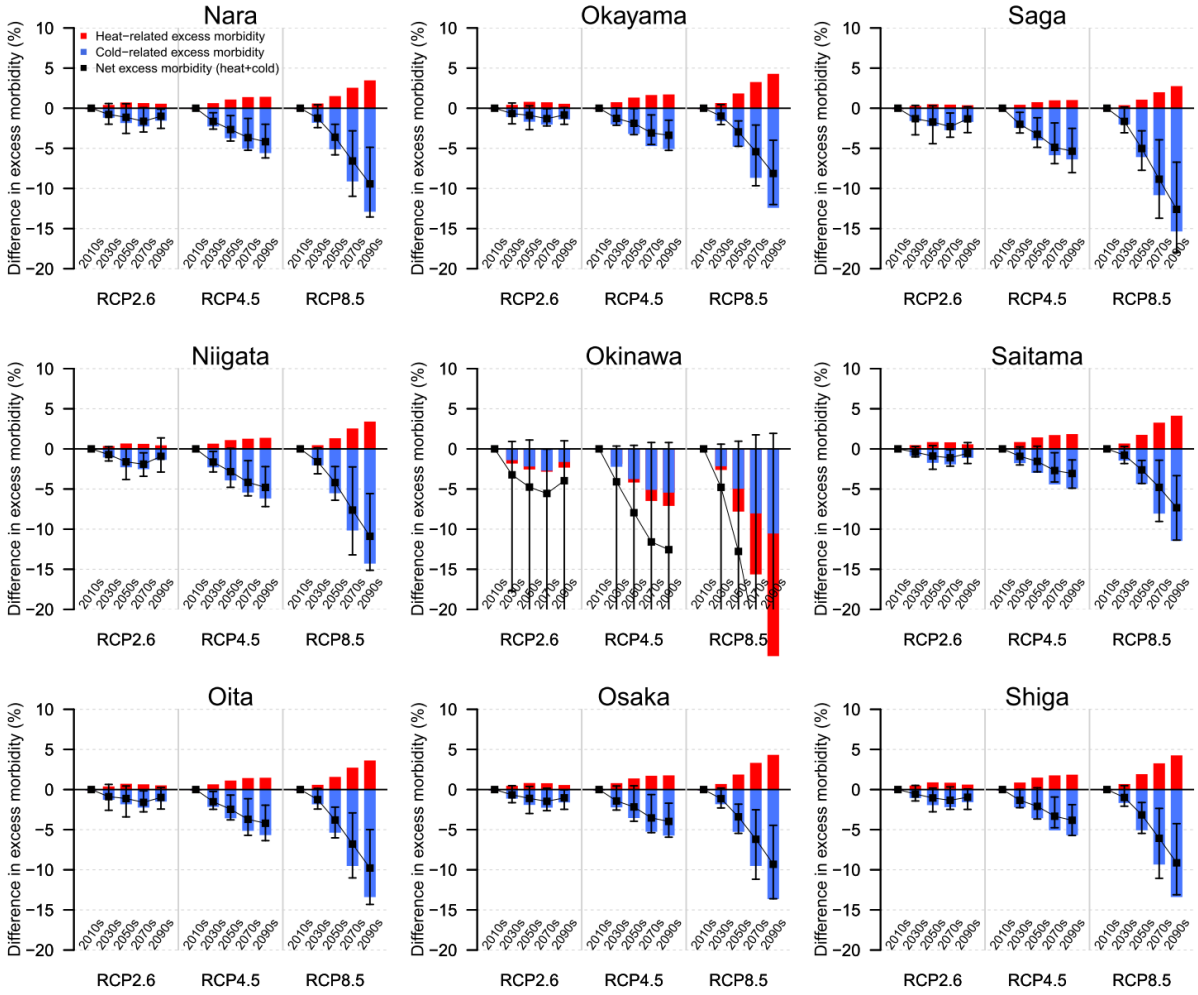
Figure S8. Temporal change in excess morbidity in diarrhea by prefecture.

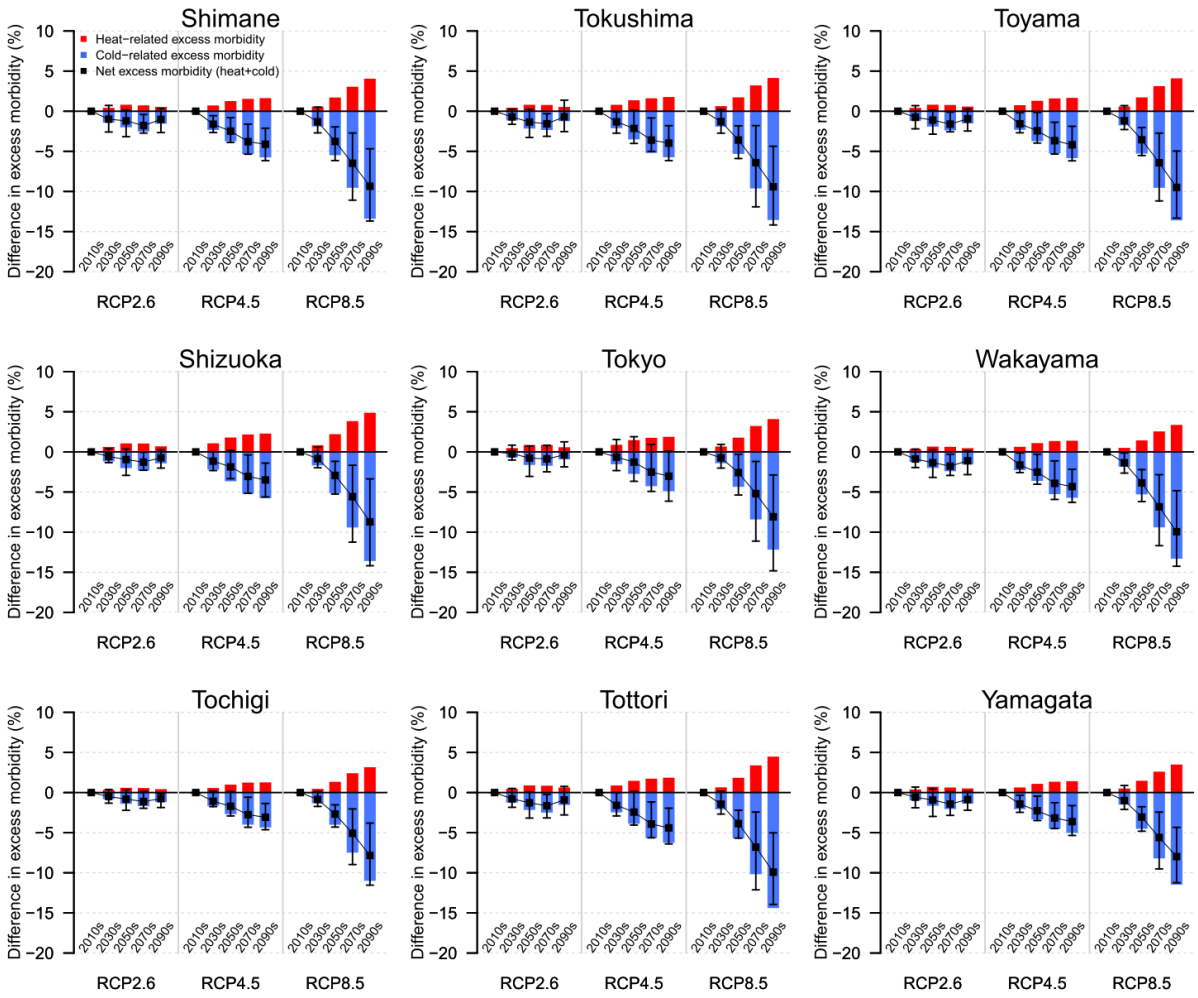
RCP=representative concentration pathway.

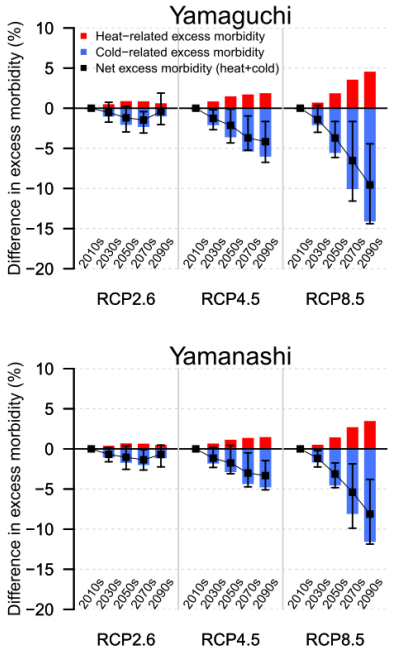



Gunma
Hyogo
Iwate
Hiroshima
Ibaraki
Kagawa
Hokkaido
Ishikawa
Kagoshima
Heat−related excess morbidity
Cold−related excess morbidity
Net excess morbidity (heat+cold)
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Kanagawa
Kyoto
Miyazaki
Kochi
Mie
Nagano
Kumamoto
Miyagi
Nagasaki
Heat−related excess morbidity
Cold−related excess morbidity
Net excess morbidity (heat+cold)
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5

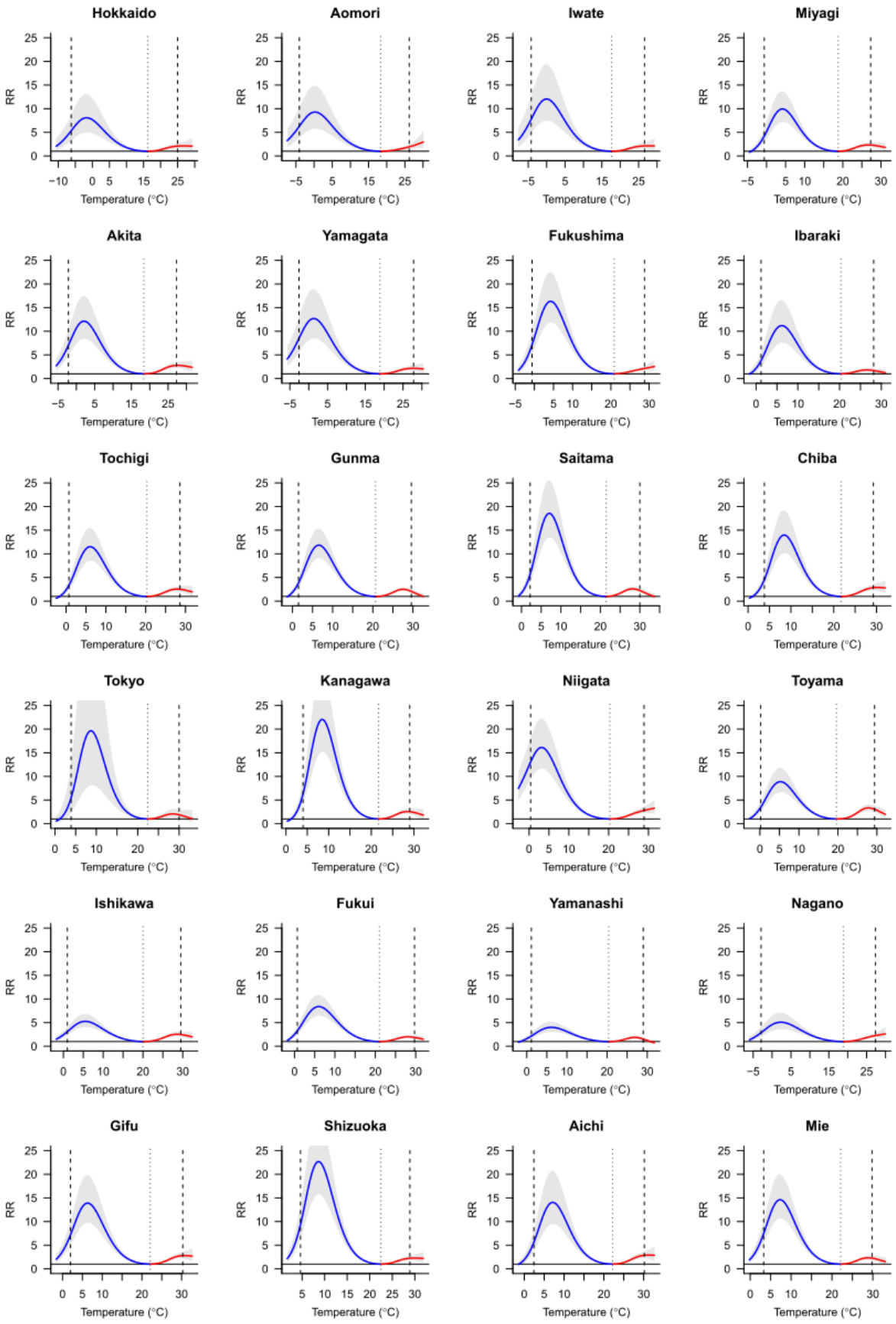

Nara
Okayama
Saga
Niigata
Okinawa
Saitama
Oita
Osaka
Shiga
Heat−related excess morbidity
Cold−related excess morbidity
Net excess morbidity (heat+cold)
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Shimane
Tokushima
Toyama
Shizuoka
Tokyo
Wakayama
Tochigi
Tottori
Yamagata
Heat−related excess morbidity
Cold−related excess morbidity
Net excess morbidity (heat+cold)
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5


Yamaguchi
Heat−related excess morbidity
Cold−related excess morbidity
Net excess morbidity (heat+cold)
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5

Yamanashi
Difference in excess morbidity (%)
10
5
0
−5
−10
−15
−20
2010s
2030s
2050s
2070s
2090s
RCP2.6
RCP4.5
RCP8.5

Figure S9. Sensitivity analysis by using uniform daily outcome counts within each week: Overall cumulative exposure-response associations between the relative risks (95% eCI) of diarrhea and temperatures in the 47 Japanese prefectures. Exposure-response associations are expressed as the best linear unbiased prediction (with 95% eCI, shaded grey) with the related temperature distributions. Vertical lines represent the percentile of minimum morbidity temperature (dotted) and the 2.5th and 97.5th percentiles of the temperature distribution (dashed).


Hokkaido
Aomori
Iwate
Miyagi
Akita
Yamagata
Fukushima
Ibaraki
Tochigi
Gunma
Saitama
Chiba
Tokyo
Kanagawa
Niigata
Toyama
Ishikawa
Fukui
Yamanashi
Nagano
Gifu
Shizuoka
Aichi
Mie
RR
Temperature (°C)

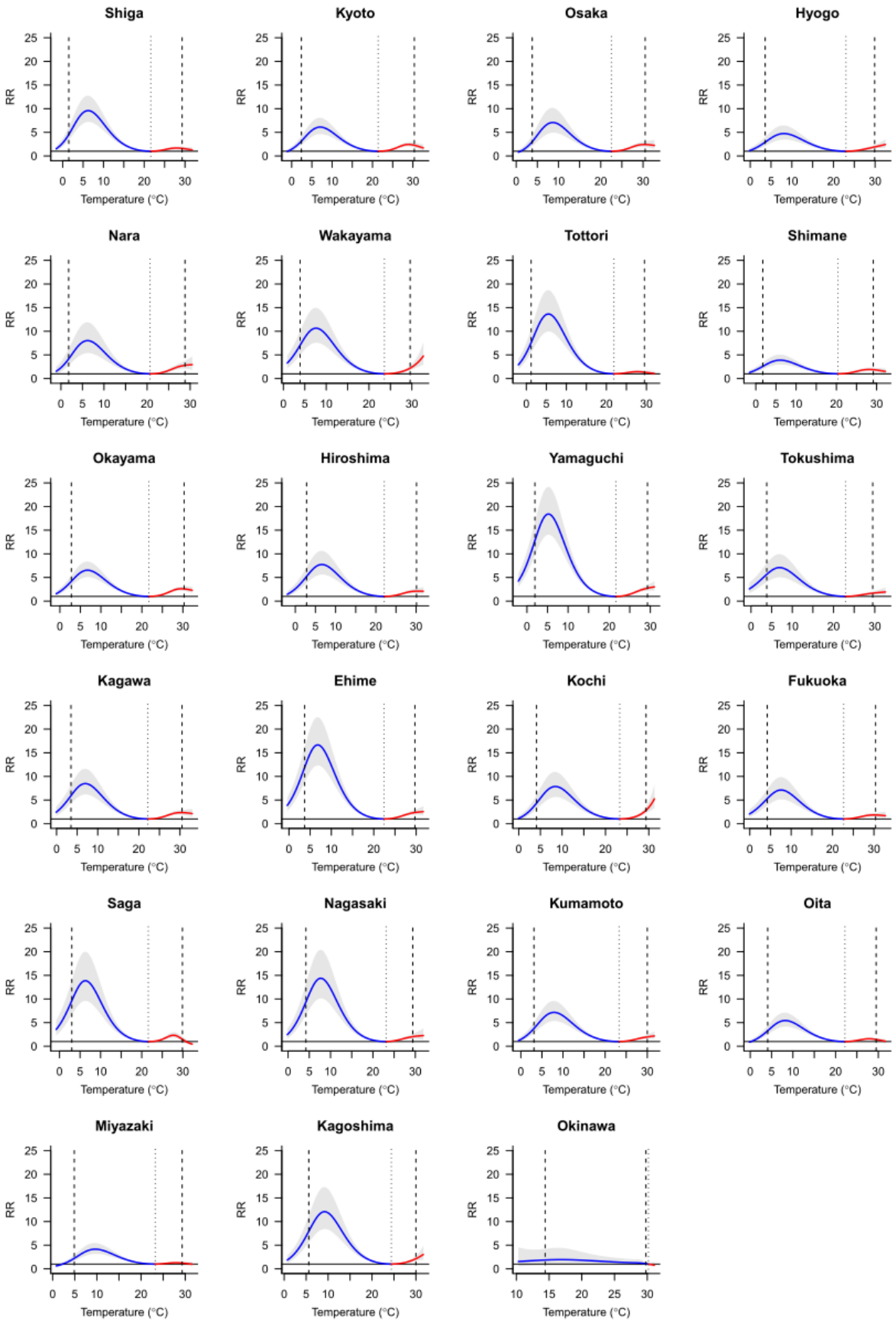

Shiga
Kyoto
Osaka
Hyogo
Nara
Wakayama
Tottori
Shimane
Okayama
Hiroshima
Yamaguchi
Tokushima
Kagawa
Ehime
Kochi
Fukuoka
Saga
Nagasaki
Kumamoto
Oita
Miyazaki
Kagoshima
Okinawa
RR
Temperature (°C)

Table S1. Descriptive statistics by prefecture.

Prefecture	Population sizes in 2010	Total cases in 2005–2015	Annual mean incidence per 100,000 population	Average weekly temperature, ℃				
				Annual	Spring (from March to May)	Summer (from June to August)	Autumn (from September to November)	Winter (from December to February)
Aichi	7,410,719	620,229	760.8	16.3 (1.2–30.9)	14.7 (4.5–24.4)	26.4 (20.3-30.9)	18.5 (8.1–29.8)	5.7 (1.2–13.1)
Akita	1,085,997	101,871	852.8	12.2 (-2.7–28.9)	9.9 (0.2–20.9)	23.2 (17.2-28.9)	14.4 (3.6–26.3)	1.1 (-2.7–7.4)
Aomori	1,373,339	86,792	574.5	10.8 (-4.2–27.4)	8.5 (-1.1–19.3)	21.5 (14.4-27.4)	13.4 (1.5–25.6)	–0.3 (-4.2–6.8)
Chiba	6,216,289	464,951	680.0	16.4 (2.6–30.2)	14.7 (5.5–22.9)	25.3 (18.9-30.2)	18.5 (8.8–28.5)	6.9 (2.6–12.7)
Ehime	1,431,493	189,066	1200.7	16.8 (3.1–30.6)	15.0 (5.7–23.5)	26.3 (19.6-30.6)	19.0 (8.7–29.1)	6.9 (3.1–12.4)
Fukui	806,314	135,578	1528.6	14.9 (0.1–30.2)	13.0 (2.5–24.2)	25.6 (19.4-30.2)	17.0 (6.2–28.0)	3.9 (0.1–11.0)
Fukuoka	5,071,968	562,221	1007.7	17.4 (3.1–31.4)	15.8 (7.0–24.0)	26.7 (20.7-31.4)	19.4 (9.3–28.6)	7.7 (3.1–13.0)
Fukushima	2,029,064	149,678	670.6	13.5 (-1.7–30.2)	11.9 (1.7–23.9)	24.0 (17.0-30.2)	15.4 (4.3–27.3)	2.6 (-1.7–7.8)
Gifu	2,080,773	122,084	533.4	16.2 (0.8–31.4)	14.6 (4.3–25.0)	26.5 (20.3-31.4)	18.4 (7.6–29.5)	5.5 (0.8–12.9)
Gunma	2,008,068	235,313	1065.3	15.1 (0.5–30.2)	13.7 (3.2–24.7)	25.3 (18.8-30.2)	17.0 (6.8–28.4)	4.5 (0.5–10.3)
Hiroshima	2,860,750	293,064	931.3	16.5 (1.7–30.9)	14.8 (5.4–23.8)	26.5 (20.4-30.9)	18.6 (7.5–29.3)	6.1 (1.7–11.9)
Hokkaido	5,506,419	244,704	404.0	9.5 (-6.7–26.3)	7.5 (-3.3–20.3)	20.9 (13.6-26.3)	11.8 (-0.4–24.7)	–2.2 (-6.7–4.3)
Hyogo	5,588,133	544,749	886.2	17.1 (3.2–31.0)	15.1 (5.5–23.8)	26.6 (20.6-31.0)	19.6 (9.6–29.5)	7.0 (3.2–13.6)
Ibaraki	2,969,770	213,780	654.4	14.2 (0.6–29.3)	12.5 (3.7–22.4)	23.8 (17.3-29.3)	16.4 (6.3–27.2)	4.2 (0.6–10.8)
Ishikawa	1,169,788	120,166	933.9	15.0 (0.4–30.4)	12.8 (2.8–24.3)	25.3 (19.3-30.4)	17.3 (7.0–27.4)	4.6 (0.4–11.1)
Iwate	1,330,147	109,305	747.0	10.7 (-5.4–27.6)	9.0 (-1.6–22.0)	22.2 (16.4-27.6)	12.6 (1.1–25.9)	–0.8 (-5.4–5.8)
Kagawa	995,842	114,591	1046.1	16.8 (2.9–31.9)	15.0 (5.6–24.0)	26.8 (20.3-31.9)	18.9 (9.1–30.1)	6.5 (2.9–12.4)
Kagoshima	1,706,242	240,666	1282.3	18.8 (4.6–30.6)	17.2 (8.6–23.7)	27.2 (21.9-30.6)	21.2 (10.5–29.0)	9.7 (4.6–15.8)
Kanagawa	9,048,331	763,804	767.4	16.3 (3.2–30.2)	14.7 (5.4–22.8)	25.2 (19.1-30.2)	18.5 (8.9–28.2)	6.9 (3.2–12.5)
Kochi	764,456	99,461	1182.8	17.4 (3.0–30.3)	16.0 (7.2–23.0)	26.3 (21.1-30.3)	19.6 (8.6–28.9)	7.7 (3.0–14.8)
Kumamoto	1,817,426	241,297	1207.0	17.3 (2.1–30.5)	16.1 (6.6–24.3)	26.8 (21.2-30.5)	19.3 (8.4–29.0)	7.0 (2.1–14.2)
Kyoto	2,636,092	240,050	827.8	16.2 (1.9–31.4)	14.4 (4.4–25.4)	26.6 (20.1-31.4)	18.2 (7.7–29.2)	5.6 (1.9–12.4)
Mie	1,854,724	207,269	1015.9	16.4 (2.7–31.4)	14.3 (4.9–23.4)	26.1 (19.9-31.4)	18.6 (8.8–29.3)	6.4 (2.7–13.4)
Miyagi	2,348,165	247,320	957.5	12.9 (-1.7–28.7)	10.8 (1.4–21.1)	22.7 (16.3-28.7)	15.4 (4.7–26.2)	2.7 (-1.7–9.3)
Miyazaki	1,135,233	230,533	1846.1	17.7 (4.4–30.5)	16.4 (8.3–22.8)	26.2 (20.1-30.5)	19.6 (9.8–27.5)	8.6 (4.4–14.7)
Nagano	2,152,449	206,981	874.2	12.3 (-3.7–28.2)	10.8 (-0.8–22.5)	23.7 (17.5-28.2)	14.3 (3.3–26.1)	0.6 (-3.7–8.2)
Nagasaki	1,426,779	157,175	1001.5	17.4 (3.4–30.2)	15.7 (7.4–22.9)	26.2 (20.8-30.2)	19.7 (9.5–28.5)	8.0 (3.4–13.9)

Nara	1,400,728	100,896	654.8	15.2 (1.4–29.7)	13.5 (3.9–23.5)	25.4 (18.8-29.7)	16.9 (6.9–27.8)	4.8 (1.4–11.5)
Niigata	2,374,450	207,904	796.0	14.1 (-0.2–29.9)	11.8 (2.0–22.8)	24.6 (18.8-29.9)	16.6 (6.3–27.0)	3.6 (-0.2–9.5)
Oita	1,196,529	247,221	1878.3	16.9 (3.2–30.8)	15.2 (6.7–22.8)	26.0 (20.0-30.8)	19.0 (9.3–28.5)	7.3 (3.2–12.7)
Okayama	1,945,276	225,919	1055.8	16.5 (2.5–31.0)	14.8 (5.2–24.5)	26.8 (19.8-31.0)	18.5 (7.6–30.1)	5.9 (2.5–11.8)
Okinawa	1,392,818	53,377	348.4	23.3 (14.0–30.4)	21.6 (15.9–27.3)	28.5 (24.5-30.4)	25.3 (17.6–29.7)	17.8 (14.0–22.2)
Osaka	8,865,245	724,780	743.2	17.1 (3.0–31.5)	15.3 (5.6–24.4)	27.0 (20.5-31.5)	19.3 (9.4–30.2)	6.9 (3.0–13.2)
Saga	849,788	73,260	783.7	17.0 (2.0–30.9)	15.6 (6.4–24.3)	26.6 (21.4-30.9)	18.9 (8.3–28.5)	6.7 (2.0–13.0)
Saitama	7,194,556	686,222	867.1	15.6 (1.4–30.5)	14.2 (4.1–24.3)	25.6 (18.9-30.5)	17.4 (7.1–29.0)	5.1 (1.4–10.6)
Shiga	1,410,777	112,451	724.6	15.1 (0.8–29.9)	12.7 (3.0–23.1)	25.5 (19.0-29.9)	17.5 (7.4–28.2)	4.7 (0.8–11.7)
Shimane	717,397	107,173	1358.1	15.3 (1.6–30.1)	13.4 (3.8–23.7)	25.2 (18.9-30.1)	17.3 (7.3–28.0)	5.2 (1.6–10.3)
Shizuoka	3,765,007	333,550	805.4	16.9 (3.7–29.5)	15.3 (6.4–23.0)	25.5 (20.3-29.5)	19.2 (9.6–28.3)	7.8 (3.7–14.2)
Tochigi	2,007,683	109,203	494.5	14.5 (0.2–29.2)	13.1 (3.1–24.1)	24.4 (18.1-29.2)	16.5 (5.7–27.5)	3.8 (0.2–10.6)
Tokushima	785,491	85,176	985.8	16.9 (3.4–30.9)	15.1 (5.9–23.1)	26.2 (20.7-30.9)	19.1 (9.1–29.3)	7.0 (3.4–12.9)
Tokyo	13,159,388	799,377	552.2	16.7 (3.3–31.1)	15.1 (5.7–24.5)	25.9 (19.3-31.1)	18.8 (9.2–29.0)	6.9 (3.3–12.1)
Tottori	588,667	78,700	1215.4	15.2 (1.0–30.4)	13.3 (3.9–24.0)	25.5 (19.1-30.4)	17.2 (7.3–28.4)	4.9 (1.0–11.3)
Toyama	1,093,247	136,660	1136.4	14.6 (-0.3–30.2)	12.6 (2.0–23.9)	25.1 (19.2-30.2)	16.9 (6.6–27.4)	3.7 (-0.3–10.7)
Wakayama	1,002,198	87,154	790.6	16.9 (3.3–31.1)	15.2 (5.9–23.5)	26.5 (20.6-31.1)	19.1 (9.4–29.3)	7.0 (3.3–13.2)
Yamagata	1,168,924	126,337	982.5	12.1 (-3.3–28.7)	10.4 (-0.6–23.0)	23.5 (17.8-28.7)	13.9 (2.4–25.7)	0.5 (-3.3–7.1)
Yamaguchi	1,451,338	223,188	1398.0	15.8 (1.1–30.5)	14.3 (4.8–22.8)	25.8 (20.0-30.5)	17.7 (6.6–28.0)	5.4 (1.1–11.7)
Yamanashi	863,075	68,587	722.4	15.2 (0.1–30.1)	14.1 (3.3–23.9)	25.4 (19.5-30.1)	16.9 (6.6–28.0)	4.3 (0.1–11.1)

Table S2. Heat-related, cold-related, and net change in excess morbidity in diarrhea (%) with 95% eCI by prefecture and period under the RCP2.6 scenario. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017; Vicedo-Cabrera et al. 2019). Estimates are presented as GCM-ensemble average decadal fractions. GCM=general circulation model; RCP=representative concentration pathway.

		RCP2.6		
		2010–2019	2050–2059	2090–2099
Aichi	Heat	6.8 (5.5, 7.9)	7.6 (5.9, 9.2)	7.4 (5.9, 8.7)
	Cold	65.3 (59.0, 69.4)	63.6 (56.9, 68.4)	64.0 (57.6, 68.4)
	Net	-	-0.9 (-2.4, 0.3)	-0.7 (-1.9, 0.2)
Akita	Heat	5.8 (4.4, 6.9)	6.6 (5.0, 8.0)	6.3 (4.5, 7.7)
	Cold	68.1 (62.3, 71.7)	66.3 (60.1, 70.6)	67.1 (61.1, 72.7)
	Net	-	-0.9 (-2.8, 0.2)	-0.4 (-1.6, 1.7)
Aomori	Heat	4.0 (2.4, 5.4)	4.7 (2.8, 6.2)	4.4 (2.4, 6.0)
	Cold	70.2 (61.6, 75.1)	68.5 (59.3, 73.9)	69.5 (60.5, 76.4)
	Net	-	-1.1 (-3.3, 0.1)	-0.4 (-1.8, 2.2)
Chiba	Heat	6.0 (5.0, 7.0)	6.9 (5.5, 8.2)	6.6 (5.4, 7.6)
	Cold	71.8 (68.5, 74.2)	69.8 (65.0, 73.6)	70.7 (66.9, 74.0)
	Net	-	-1.2 (-3.2, 0.3)	-0.6 (-2.2, 1.2)
Ehime	Heat	6.5 (5.3, 7.4)	7.3 (5.9, 8.6)	7.1 (5.9, 8.1)
	Cold	64.9 (59.3, 68.6)	63.0 (56.8, 67.6)	63.3 (57.4, 67.5)
	Net	-	-1.0 (-3.0, 0.4)	-1.0 (-2.4, 0.1)
Fukui	Heat	5.6 (4.4, 6.6)	6.3 (4.8, 7.5)	6.1 (4.7, 7.2)
	Cold	59.4 (52.6, 64.2)	57.9 (50.6, 63.2)	58.1 (51.0, 63.1)
	Net	-	-0.9 (-3.1, 0.7)	-0.9 (-2.4, 0.2)
Fukuoka	Heat	5.5 (4.1, 6.8)	6.3 (4.6, 8.2)	6.1 (4.5, 7.6)
	Cold	52.6 (43.4, 59.5)	50.4 (40.6, 57.7)	51.0 (41.4, 58.1)
	Net	-	-1.4 (-3.4, 0.0)	-1.0 (-2.7, 0.7)
Fukushima	Heat	5.6 (4.4, 6.6)	6.4 (5.0, 7.9)	6.1 (4.7, 7.3)
	Cold	67.1 (61.6, 70.7)	65.3 (59.2, 69.5)	66.2 (60.5, 71.3)
	Net	-	-1.0 (-2.5, 0.2)	-0.4 (-2.1, 1.8)
Gifu	Heat	6.1 (4.8, 7.3)	6.9 (5.2, 8.5)	6.7 (5.1, 8.1)
	Cold	59.7 (50.7, 65.7)	57.9 (48.8, 64.5)	58.4 (49.4, 64.5)
	Net	-	-1.0 (-2.6, 0.3)	-0.8 (-2.0, 0.3)
Gunma	Heat	6.2 (5.2, 7.1)	7.0 (5.7, 8.4)	6.8 (5.6, 7.9)

	Cold	67.9 (63.8, 70.8)	66.2 (61.2, 69.9)	66.7 (62.6, 70.1)
	Net	-	-0.9 (-2.4, 0.3)	-0.6 (-1.9, 0.7)
Hiroshima	Heat	5.7 (4.4, 6.8)	6.4 (5.0, 7.8)	6.2 (4.9, 7.4)
	Cold	56.8 (48.2, 62.5)	55.1 (46.3, 61.4)	55.4 (46.8, 61.4)
	Net	-	-1.0 (-3.1, 0.4)	-0.9 (-2.2, 0.2)
Hokkaido	Heat	4.6 (1.6, 6.7)	5.4 (2.0, 8.0)	5.3 (1.9, 7.8)
	Cold	57.5 (44.2, 64.8)	55.6 (42.8, 63.3)	55.9 (42.6, 64.3)
	Net	-	-1.0 (-3.1, 0.5)	-0.9 (-2.8, 1.8)
Hyogo	Heat	5.2 (3.8, 6.3)	6.1 (4.3, 7.7)	5.8 (4.2, 7.1)
	Cold	52.9 (43.5, 59.2)	50.9 (41.3, 57.9)	51.3 (41.8, 57.9)
	Net	-	-1.1 (-2.8, 0.3)	-1.0 (-2.5, 0.1)
Ibaraki	Heat	4.5 (3.2, 5.7)	5.2 (3.6, 6.8)	5.0 (3.4, 6.3)
	Cold	66.7 (61.1, 70.5)	65.0 (58.9, 69.6)	65.8 (60.0, 70.1)
	Net	-	-1.0 (-2.9, 0.4)	-0.5 (-2.0, 1.2)
Ishikawa	Heat	4.8 (3.8, 5.8)	5.5 (4.2, 6.9)	5.3 (4.1, 6.3)
	Cold	61.7 (54.2, 66.8)	59.6 (51.7, 65.3)	60.3 (52.5, 66.1)
	Net	-	-1.4 (-3.3, -0.0)	-0.9 (-2.8, 0.9)
Iwate	Heat	5.8 (4.2, 7.1)	6.6 (4.9, 8.2)	6.3 (4.2, 7.9)
	Cold	67.9 (61.2, 72.0)	66.3 (59.2, 70.9)	67.3 (60.3, 73.2)
	Net	-	-0.8 (-2.4, 0.2)	-0.1 (-1.4, 2.0)
Kagawa	Heat	6.1 (4.8, 7.3)	6.9 (5.2, 8.3)	6.6 (5.1, 7.9)
	Cold	56.1 (46.7, 62.1)	54.2 (44.6, 61.0)	54.5 (45.1, 60.8)
	Net	-	-1.2 (-3.2, 0.3)	-1.1 (-2.6, 0.0)
Kagoshima	Heat	6.5 (5.2, 7.7)	7.6 (5.7, 9.2)	7.2 (5.7, 8.5)
	Cold	59.8 (52.8, 64.5)	57.3 (49.4, 63.6)	58.3 (51.0, 63.6)
	Net	-	-1.5 (-3.9, 0.4)	-0.8 (-3.0, 1.2)
Kanagawa	Heat	5.8 (4.5, 6.8)	6.5 (5.0, 7.8)	6.3 (5.0, 7.4)
	Cold	71.2 (67.1, 74.0)	69.5 (64.5, 73.2)	69.7 (65.2, 73.1)
	Net	-	-1.0 (-3.0, 0.4)	-1.0 (-2.2, -0.1)
Kochi	Heat	4.7 (3.5, 5.6)	5.3 (3.9, 6.5)	5.2 (3.8, 6.2)
	Cold	63.1 (54.9, 68.3)	61.1 (52.5, 67.1)	61.4 (53.0, 67.1)
	Net	-	-1.3 (-3.6, 0.5)	-1.1 (-3.0, 0.2)
Kumamoto	Heat	5.8 (4.3, 7.0)	6.6 (4.9, 8.0)	6.4 (4.8, 7.7)
	Cold	52.3 (42.6, 58.8)	50.5 (40.7, 57.8)	50.9 (41.3, 57.5)
	Net	-	-1.0 (-2.9, 0.6)	-0.8 (-2.2, 0.3)
Kyoto	Heat	6.5 (5.3, 7.7)	7.3 (5.7, 8.9)	7.1 (5.7, 8.4)
	Cold	56.9 (49.4, 62.2)	55.0 (47.2, 60.9)	55.3 (47.9, 60.9)
	Net	-	-1.1 (-2.8, 0.3)	-1.0 (-2.3, -0.0)
Mie	Heat	6.2 (5.1, 7.2)	7.0 (5.5, 8.3)	6.8 (5.6, 8.0)
	Cold	64.8 (59.7, 68.6)	63.0 (57.1, 67.7)	63.4 (58.1, 67.5)
	Net	-	-1.0 (-2.8, 0.3)	-0.9 (-2.2, -0.0)

Miyagi	Heat	5.3 (3.9, 6.5)	6.1 (4.5, 7.7)	5.8 (4.0, 7.2)
	Cold	68.5 (63.8, 71.8)	66.7 (61.0, 70.7)	67.8 (62.7, 72.9)
	Net	-	-1.0 (-2.8, 0.3)	-0.2 (-1.8, 2.1)
Miyazaki	Heat	3.4 (1.8, 4.7)	3.9 (1.9, 5.5)	3.8 (1.8, 5.2)
	Cold	48.6 (37.2, 56.4)	46.7 (35.2, 55.0)	47.1 (35.8, 54.9)
	Net	-	-1.4 (-3.7, 0.5)	-1.1 (-2.9, 0.1)
Nagano	Heat	6.1 (4.7, 7.4)	7.0 (5.3, 8.9)	6.7 (5.1, 8.2)
	Cold	59.4 (51.9, 64.7)	57.8 (50.2, 63.3)	58.3 (50.8, 63.7)
	Net	-	-0.7 (-2.0, 0.2)	-0.5 (-2.1, 0.8)
Nagasaki	Heat	4.9 (3.8, 5.8)	5.7 (4.2, 7.1)	5.4 (4.2, 6.5)
	Cold	65.4 (58.0, 70.3)	63.1 (54.9, 69.1)	63.7 (55.9, 69.0)
	Net	-	-1.5 (-3.6, 0.2)	-1.2 (-2.8, 0.1)
Nara	Heat	5.4 (4.2, 6.4)	6.1 (4.7, 7.3)	6.0 (4.7, 7.0)
	Cold	64.8 (58.6, 69.0)	63.0 (56.2, 68.0)	63.3 (56.7, 67.8)
	Net	-	-1.1 (-3.1, 0.6)	-1.0 (-2.5, -0.1)
Niigata	Heat	4.7 (3.8, 5.5)	5.4 (4.3, 6.6)	5.2 (4.1, 6.1)
	Cold	68.8 (63.3, 72.5)	66.5 (60.0, 70.9)	67.4 (61.6, 72.7)
	Net	-	-1.6 (-3.8, -0.0)	-0.9 (-2.9, 1.4)
Oita	Heat	5.2 (3.6, 6.6)	5.9 (4.0, 7.6)	5.7 (3.9, 7.2)
	Cold	51.5 (42.3, 57.8)	49.7 (40.3, 56.5)	50.0 (40.8, 56.5)
	Net	-	-1.1 (-3.4, 0.4)	-1.0 (-2.4, 0.2)
Okayama	Heat	6.4 (5.2, 7.4)	7.2 (5.6, 8.7)	6.9 (5.6, 8.0)
	Cold	55.8 (49.2, 60.5)	54.1 (47.1, 59.5)	54.4 (47.8, 59.4)
	Net	-	-0.9 (-2.7, 0.3)	-0.8 (-2.0, 0.1)
Okinawa	Heat	-3.9 (-28.3, 2.7)	-6.4 (-52.5, 4.3)	-6.2 (-48.0, 4.2)
	Cold	41.5 (-1.5, 60.1)	39.3 (-2.6, 58.1)	39.8 (-1.7, 58.1)
	Net	-	-4.8 (-28.6, 1.1)	-4.0 (-23.9, 1.0)
Osaka	Heat	6.5 (4.9, 7.8)	7.3 (5.4, 9.1)	7.1 (5.3, 8.6)
	Cold	57.2 (49.0, 63.0)	55.3 (46.7, 61.7)	55.6 (47.2, 61.6)
	Net	-	-1.1 (-3.0, 0.4)	-1.0 (-2.5, -0.0)
Saga	Heat	4.2 (3.4, 4.9)	4.7 (3.8, 5.6)	4.6 (3.7, 5.3)
	Cold	67.6 (58.7, 73.1)	65.4 (55.9, 72.0)	65.9 (56.6, 71.8)
	Net	-	-1.7 (-4.4, 0.3)	-1.3 (-3.0, 0.2)
Saitama	Heat	6.8 (5.8, 7.6)	7.6 (6.3, 8.9)	7.4 (6.2, 8.3)
	Cold	70.0 (66.6, 72.4)	68.2 (63.8, 71.7)	68.8 (65.2, 71.9)
	Net	-	-0.9 (-2.5, 0.4)	-0.6 (-1.8, 0.8)
Shiga	Heat	6.1 (4.9, 7.1)	7.0 (5.4, 8.5)	6.7 (5.3, 7.9)
	Cold	64.1 (58.7, 68.0)	62.2 (56.0, 66.8)	62.6 (56.8, 66.9)
	Net	-	-1.0 (-2.8, 0.2)	-1.0 (-2.5, 0.1)
Shimane	Heat	5.3 (3.6, 6.7)	6.1 (4.1, 7.9)	5.8 (4.0, 7.3)
	Cold	49.4 (39.1, 56.2)	47.4 (36.9, 54.8)	47.8 (37.5, 55.0)

	Net	-	-1.2 (-3.2, 0.1)	-1.0 (-2.7, 0.3)
Shizuoka	Heat	6.3 (4.9, 7.5)	7.4 (5.5, 9.1)	7.0 (5.4, 8.4)
	Cold	68.0 (63.8, 70.9)	65.9 (60.6, 70.2)	66.5 (62.1, 69.9)
	Net	-	-1.0 (-2.9, 0.4)	-0.7 (-2.0, 0.3)
Tochigi	Heat	4.2 (3.3, 5.0)	4.8 (3.7, 5.9)	4.6 (3.6, 5.5)
	Cold	72.3 (67.2, 75.6)	70.9 (65.3, 74.8)	71.1 (65.9, 74.7)
	Net	-	-0.8 (-2.2, 0.3)	-0.8 (-1.9, -0.1)
Tokushima	Heat	5.4 (4.1, 6.6)	6.2 (4.5, 7.8)	5.9 (4.4, 7.3)
	Cold	60.0 (52.6, 65.3)	57.8 (50.0, 63.8)	58.7 (51.3, 64.6)
	Net	-	-1.4 (-3.3, 0.2)	-0.7 (-2.5, 1.4)
Tokyo	Heat	6.2 (3.2, 8.3)	7.1 (3.5, 9.5)	6.8 (3.5, 9.1)
	Cold	68.3 (56.1, 73.7)	66.7 (54.9, 72.7)	67.4 (55.5, 72.9)
	Net	-	-0.8 (-3.1, 0.7)	-0.4 (-1.9, 1.3)
Tottori	Heat	6.4 (4.9, 7.6)	7.3 (5.5, 9.1)	7.0 (5.4, 8.4)
	Cold	58.5 (50.8, 63.5)	56.3 (48.0, 62.1)	56.9 (49.1, 62.7)
	Net	-	-1.3 (-3.2, 0.1)	-0.9 (-2.8, 0.8)
Toyama	Heat	6.4 (5.4, 7.3)	7.2 (5.9, 8.7)	7.0 (5.8, 8.0)
	Cold	65.7 (60.7, 69.2)	63.8 (58.0, 68.0)	64.2 (58.7, 68.5)
	Net	-	-1.1 (-2.9, 0.1)	-0.9 (-2.5, 0.3)
Wakayama	Heat	4.2 (3.0, 5.4)	4.9 (3.4, 6.4)	4.7 (3.3, 6.0)
	Cold	56.8 (45.6, 64.2)	54.8 (43.8, 62.7)	55.2 (44.1, 62.8)
	Net	-	-1.3 (-3.2, 0.3)	-1.1 (-2.8, 0.1)
Yamagata	Heat	5.2 (3.9, 6.3)	5.9 (4.4, 7.4)	5.7 (4.3, 6.9)
	Cold	65.1 (57.7, 69.7)	63.5 (55.7, 68.5)	63.7 (56.1, 68.7)
	Net	-	-0.9 (-3.0, 0.4)	-0.9 (-2.2, 0.1)
Yamaguchi	Heat	6.5 (5.4, 7.4)	7.3 (6.0, 8.8)	7.1 (5.6, 8.3)
	Cold	64.5 (59.2, 68.2)	62.4 (56.3, 67.0)	63.5 (57.8, 68.8)
	Net	-	-1.2 (-3.0, 0.2)	-0.4 (-2.0, 1.9)
Yamanashi	Heat	5.0 (3.8, 6.2)	5.7 (4.2, 7.2)	5.5 (4.2, 6.8)
	Cold	57.2 (47.9, 63.8)	55.4 (46.1, 62.6)	56.0 (46.9, 62.7)
	Net	-	-1.0 (-2.5, 0.4)	-0.7 (-2.2, 0.5)

Table S3. Heat-related, cold-related, and net change in excess morbidity in diarrhea (%) with 95% eCI by prefecture and period under the RCP4.5 scenario. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017; Vicedo-Cabrera et al. 2019). Estimates are presented as GCM-ensemble average decadal fractions. GCM=general circulation model; RCP=representative concentration pathway.

		RCP4.5		
		2010–2019	2050–2059	2090–2099
Aichi	Heat	6.7 (5.4, 7.8)	8.1 (6.5, 9.4)	8.5 (6.7, 9.9)
	Cold	65.6 (59.3, 69.7)	62.5 (56.2, 67.2)	60.6 (54.1, 65.3)
	Net	-	-1.6 (-3.1, 0.7)	-3.2 (-4.9, -1.4)
Akita	Heat	5.6 (4.2, 6.7)	7.0 (5.3, 8.4)	7.3 (5.5, 8.8)
	Cold	68.3 (62.5, 72.1)	64.9 (58.8, 69.2)	62.9 (56.5, 67.7)
	Net	-	-2.0 (-3.7, 0.2)	-3.7 (-6.1, -1.3)
Aomori	Heat	3.8 (2.3, 5.1)	5.1 (3.1, 6.6)	5.3 (3.2, 6.9)
	Cold	70.4 (61.6, 75.5)	66.9 (57.9, 72.5)	64.8 (55.7, 71.1)
	Net	-	-2.3 (-4.3, 0.5)	-4.1 (-6.8, -1.0)
Chiba	Heat	5.9 (4.9, 6.9)	7.4 (6.1, 8.6)	7.8 (6.3, 9.1)
	Cold	72.1 (68.7, 74.4)	68.7 (64.6, 72.0)	66.5 (62.0, 70.3)
	Net	-	-2.0 (-3.6, -0.2)	-3.8 (-6.1, -1.7)
Ehime	Heat	6.3 (5.2, 7.3)	7.8 (6.4, 8.9)	8.2 (6.5, 9.4)
	Cold	65.3 (59.7, 69.2)	61.6 (55.9, 65.9)	59.6 (53.6, 64.2)
	Net	-	-2.2 (-3.5, -0.5)	-3.9 (-5.8, -2.1)
Fukui	Heat	5.5 (4.3, 6.5)	6.5 (5.0, 7.7)	6.8 (5.1, 8.1)
	Cold	60.0 (52.9, 64.9)	56.6 (49.8, 61.6)	54.9 (47.9, 60.3)
	Net	-	-2.4 (-3.8, -0.4)	-3.8 (-5.8, -1.6)
Fukuoka	Heat	5.3 (4.0, 6.5)	6.7 (5.0, 8.3)	7.1 (5.1, 8.9)
	Cold	52.8 (43.3, 59.6)	48.9 (39.4, 56.1)	46.4 (37.0, 54.1)
	Net	-	-2.5 (-4.4, -0.0)	-4.6 (-7.1, -2.0)
Fukushima	Heat	5.4 (4.3, 6.4)	6.7 (5.3, 8.0)	7.1 (5.5, 8.5)
	Cold	67.3 (61.8, 71.0)	64.3 (58.4, 68.5)	62.3 (56.3, 66.8)
	Net	-	-1.8 (-3.6, 0.3)	-3.4 (-5.5, -1.5)
Gifu	Heat	6.1 (4.7, 7.2)	7.3 (5.6, 8.8)	7.7 (5.8, 9.2)
	Cold	59.9 (50.8, 66.0)	56.8 (47.9, 63.1)	54.8 (46.0, 61.2)
	Net	-	-1.8 (-3.3, 0.5)	-3.4 (-5.2, -1.5)
Gunma	Heat	6.1 (5.1, 7.0)	7.5 (6.2, 8.7)	7.8 (6.4, 9.1)

	Cold	68.1 (64.1, 71.0)	65.1 (60.7, 68.7)	63.1 (58.5, 67.1)
	Net	-	-1.7 (-3.2, 0.4)	-3.3 (-5.3, -1.4)
Hiroshima	Heat	5.5 (4.3, 6.6)	6.8 (5.3, 8.0)	7.1 (5.4, 8.5)
	Cold	57.2 (48.6, 63.0)	53.8 (45.4, 59.8)	51.9 (43.3, 58.3)
	Net	-	-2.1 (-3.4, -0.5)	-3.7 (-5.7, -1.7)
Hokkaido	Heat	4.3 (1.5, 6.4)	5.9 (2.3, 8.6)	6.4 (2.4, 9.2)
	Cold	57.5 (44.1, 65.0)	53.6 (41.0, 61.6)	51.5 (39.0, 59.6)
	Net	-	-2.2 (-4.6, 1.2)	-3.9 (-7.0, -0.8)
Hyogo	Heat	5.1 (3.7, 6.2)	6.5 (4.8, 7.9)	6.9 (4.9, 8.5)
	Cold	53.2 (43.8, 59.7)	49.6 (40.2, 56.3)	47.5 (38.2, 54.3)
	Net	-	-2.2 (-3.7, -0.2)	-3.9 (-5.8, -1.8)
Ibaraki	Heat	4.4 (3.1, 5.6)	5.6 (3.9, 7.1)	6.0 (4.1, 7.6)
	Cold	66.9 (61.2, 70.7)	64.0 (58.2, 68.3)	62.1 (56.1, 66.8)
	Net	-	-1.7 (-3.5, 0.3)	-3.3 (-5.6, -1.3)
Ishikawa	Heat	4.7 (3.7, 5.5)	5.8 (4.5, 6.9)	6.1 (4.6, 7.3)
	Cold	61.9 (54.2, 67.1)	58.2 (50.6, 64.0)	55.9 (48.1, 62.1)
	Net	-	-2.5 (-4.3, 0.0)	-4.6 (-6.7, -1.9)
Iwate	Heat	5.6 (4.1, 6.9)	7.1 (5.2, 8.6)	7.4 (5.4, 9.2)
	Cold	68.2 (61.2, 72.4)	65.1 (57.9, 69.6)	63.2 (55.9, 68.6)
	Net	-	-1.6 (-3.3, 0.1)	-3.2 (-5.4, -0.4)
Kagawa	Heat	6.0 (4.7, 7.2)	7.2 (5.6, 8.6)	7.6 (5.7, 9.1)
	Cold	56.5 (46.9, 62.6)	52.8 (43.5, 59.2)	50.7 (41.4, 57.4)
	Net	-	-2.5 (-3.9, -0.3)	-4.2 (-6.1, -2.0)
Kagoshima	Heat	6.4 (5.1, 7.6)	8.3 (6.5, 9.8)	8.8 (6.8, 10.5)
	Cold	60.1 (53.1, 64.9)	55.8 (48.4, 61.4)	53.3 (45.5, 59.4)
	Net	-	-2.5 (-4.1, -0.4)	-4.4 (-6.9, -1.6)
Kanagawa	Heat	5.7 (4.5, 6.7)	6.9 (5.4, 8.1)	7.2 (5.5, 8.6)
	Cold	71.6 (67.4, 74.6)	68.1 (63.7, 71.5)	66.0 (61.3, 69.9)
	Net	-	-2.2 (-3.6, -0.2)	-4.0 (-6.0, -2.0)
Kochi	Heat	4.6 (3.4, 5.5)	5.6 (4.1, 6.7)	5.9 (4.2, 7.1)
	Cold	63.6 (55.4, 69.0)	59.8 (51.6, 65.3)	57.5 (49.1, 63.5)
	Net	-	-2.9 (-4.5, -1.0)	-4.8 (-7.1, -2.5)
Kumamoto	Heat	5.7 (4.3, 6.9)	7.0 (5.1, 8.4)	7.4 (5.4, 8.9)
	Cold	52.7 (42.9, 59.2)	49.3 (39.8, 55.9)	47.3 (37.7, 54.3)
	Net	-	-2.2 (-3.4, -0.7)	-3.7 (-6.0, -1.2)
Kyoto	Heat	6.4 (5.2, 7.5)	7.7 (6.2, 9.2)	8.1 (6.4, 9.7)
	Cold	57.2 (49.6, 62.6)	53.8 (46.3, 59.5)	51.7 (44.3, 57.4)
	Net	-	-2.1 (-3.8, 0.5)	-3.9 (-5.7, -1.6)
Mie	Heat	6.1 (5.1, 7.1)	7.5 (6.2, 8.7)	7.8 (6.4, 9.2)
	Cold	65.2 (60.0, 69.0)	61.8 (56.4, 66.1)	59.8 (54.3, 64.2)
	Net	-	-2.1 (-3.5, 0.2)	-3.7 (-5.3, -1.8)

Miyagi	Heat	5.1 (3.8, 6.3)	6.4 (4.8, 7.9)	6.8 (5.0, 8.4)
	Cold	68.8 (63.9, 72.1)	65.6 (60.3, 69.5)	63.5 (57.9, 68.1)
	Net	-	-1.9 (-4.1, -0.0)	-3.6 (-6.3, -1.1)
Miyazaki	Heat	3.3 (1.7, 4.7)	4.1 (2.0, 5.7)	4.4 (2.0, 6.1)
	Cold	49.1 (37.6, 56.8)	45.4 (34.4, 53.1)	43.3 (32.2, 51.2)
	Net	-	-2.9 (-4.5, -1.1)	-4.8 (-7.4, -2.1)
Nagano	Heat	5.9 (4.5, 7.1)	7.4 (5.6, 8.9)	7.8 (5.8, 9.5)
	Cold	59.6 (52.0, 64.9)	56.8 (49.4, 62.2)	55.1 (47.6, 60.5)
	Net	-	-1.3 (-2.5, 0.6)	-2.6 (-4.3, -1.0)
Nagasaki	Heat	4.8 (3.7, 5.6)	6.1 (4.7, 7.2)	6.5 (4.8, 7.7)
	Cold	65.7 (58.1, 70.7)	61.7 (53.8, 67.3)	59.3 (51.2, 65.2)
	Net	-	-2.7 (-4.5, -0.5)	-4.8 (-7.0, -2.4)
Nara	Heat	5.3 (4.1, 6.2)	6.4 (4.9, 7.5)	6.7 (5.0, 8.0)
	Cold	65.4 (59.1, 69.7)	61.7 (55.4, 66.1)	59.8 (53.2, 64.9)
	Net	-	-2.7 (-4.1, -0.9)	-4.2 (-6.2, -2.0)
Niigata	Heat	4.6 (3.7, 5.3)	5.7 (4.6, 6.6)	5.9 (4.7, 7.0)
	Cold	69.0 (63.4, 72.8)	65.0 (59.2, 69.6)	62.8 (56.8, 67.6)
	Net	-	-2.8 (-4.8, 0.1)	-4.8 (-7.2, -2.2)
Oita	Heat	5.1 (3.5, 6.5)	6.2 (4.2, 7.8)	6.6 (4.3, 8.3)
	Cold	52.0 (42.6, 58.3)	48.4 (39.3, 54.8)	46.3 (37.2, 53.1)
	Net	-	-2.5 (-3.8, -0.7)	-4.2 (-6.4, -1.9)
Okayama	Heat	6.2 (5.0, 7.2)	7.6 (6.0, 8.8)	7.9 (6.2, 9.4)
	Cold	56.1 (49.4, 61.0)	52.9 (46.2, 58.1)	51.1 (44.3, 56.5)
	Net	-	-1.9 (-3.3, -0.1)	-3.4 (-5.3, -1.5)
Okinawa	Heat	-4.1 (-26.7, 2.9)	-8.3 (-66.1, 5.2)	-11.2 (-107.1, 6.6)
	Cold	41.6 (-1.5, 60.2)	37.8 (-2.5, 55.8)	36.1 (-3.0, 54.1)
	Net	-	-8.0 (-43.4, 0.4)	-12.6 (-83.6, 0.8)
Osaka	Heat	6.4 (4.8, 7.7)	7.8 (5.8, 9.4)	8.1 (6.0, 9.9)
	Cold	57.6 (49.1, 63.4)	54.0 (45.8, 60.1)	51.8 (43.7, 58.0)
	Net	-	-2.2 (-4.0, 0.5)	-4.0 (-5.9, -1.7)
Saga	Heat	4.1 (3.3, 4.8)	4.9 (3.9, 5.7)	5.2 (4.0, 6.1)
	Cold	68.1 (59.1, 73.6)	64.1 (55.1, 70.0)	61.7 (52.2, 68.5)
	Net	-	-3.3 (-4.9, -1.2)	-5.4 (-8.0, -2.5)
Saitama	Heat	6.7 (5.7, 7.5)	8.1 (6.9, 9.3)	8.5 (7.1, 9.7)
	Cold	70.2 (66.9, 72.5)	67.2 (63.5, 70.4)	65.3 (61.2, 68.8)
	Net	-	-1.6 (-2.9, 0.3)	-3.1 (-4.9, -1.4)
Shiga	Heat	5.9 (4.8, 6.9)	7.4 (5.9, 8.6)	7.8 (6.1, 9.2)
	Cold	64.5 (59.0, 68.4)	60.9 (55.2, 65.4)	58.8 (53.0, 63.4)
	Net	-	-2.1 (-3.7, 0.2)	-3.8 (-5.7, -1.9)
Shimane	Heat	5.1 (3.5, 6.5)	6.4 (4.4, 8.0)	6.8 (4.5, 8.6)
	Cold	49.7 (39.4, 56.8)	46.0 (35.8, 53.1)	44.0 (33.8, 51.4)

	Net	-	-2.5 (-3.9, -0.8)	-4.1 (-6.2, -2.1)
Shizuoka	Heat	6.2 (4.9, 7.4)	8.0 (6.2, 9.6)	8.5 (6.4, 10.2)
	Cold	68.3 (64.1, 71.2)	64.6 (60.1, 68.4)	62.5 (57.6, 66.6)
	Net	-	-1.9 (-3.3, 0.2)	-3.5 (-5.6, -1.4)
Tochigi	Heat	4.1 (3.2, 4.9)	5.1 (4.0, 6.0)	5.4 (4.1, 6.4)
	Cold	72.6 (67.5, 75.9)	69.9 (64.6, 73.6)	68.2 (62.8, 72.2)
	Net	-	-1.7 (-2.9, 0.1)	-3.1 (-4.6, -1.4)
Tokushima	Heat	5.2 (4.0, 6.4)	6.6 (4.9, 8.2)	7.0 (5.1, 8.7)
	Cold	60.2 (52.6, 65.5)	56.7 (49.1, 62.4)	54.4 (46.8, 60.4)
	Net	-	-2.1 (-4.0, 0.1)	-4.0 (-6.2, -1.8)
Tokyo	Heat	6.1 (3.2, 8.2)	7.6 (3.8, 10.0)	8.0 (3.8, 10.6)
	Cold	68.5 (55.9, 74.0)	65.8 (54.4, 71.5)	63.6 (52.2, 69.7)
	Net	-	-1.3 (-3.7, 1.9)	-3.0 (-6.1, 0.1)
Tottori	Heat	6.2 (4.8, 7.3)	7.7 (5.9, 9.1)	8.0 (6.1, 9.7)
	Cold	58.8 (51.0, 63.9)	54.9 (47.1, 60.6)	52.5 (44.5, 58.5)
	Net	-	-2.4 (-4.1, 0.1)	-4.4 (-6.4, -1.9)
Toyama	Heat	6.3 (5.2, 7.1)	7.5 (6.3, 8.7)	7.9 (6.3, 9.2)
	Cold	66.0 (61.0, 69.7)	62.3 (57.0, 66.6)	60.2 (54.7, 65.0)
	Net	-	-2.4 (-4.0, -0.2)	-4.2 (-6.2, -1.9)
Wakayama	Heat	4.1 (2.9, 5.3)	5.2 (3.7, 6.6)	5.5 (3.8, 7.0)
	Cold	57.0 (46.0, 64.6)	53.4 (42.5, 61.1)	51.3 (40.6, 59.0)
	Net	-	-2.5 (-4.0, -0.3)	-4.3 (-6.3, -2.2)
Yamagata	Heat	5.0 (3.8, 6.1)	6.1 (4.6, 7.3)	6.4 (4.7, 7.7)
	Cold	65.7 (58.2, 70.4)	62.3 (54.9, 67.1)	60.6 (53.1, 65.8)
	Net	-	-2.3 (-3.5, -0.5)	-3.6 (-5.3, -1.6)
Yamaguchi	Heat	6.3 (5.3, 7.2)	7.8 (6.4, 9.1)	8.2 (6.6, 9.6)
	Cold	64.7 (59.2, 68.5)	61.1 (54.9, 65.7)	58.7 (52.3, 63.9)
	Net	-	-2.1 (-4.3, -0.1)	-4.2 (-6.7, -1.7)
Yamanashi	Heat	5.0 (3.8, 6.1)	6.1 (4.6, 7.5)	6.4 (4.8, 7.9)
	Cold	57.3 (48.1, 64.0)	54.4 (45.3, 61.2)	52.5 (43.5, 59.5)
	Net	-	-1.8 (-3.1, 0.4)	-3.3 (-5.1, -1.5)

Table S4. Heat-related, cold-related, and net change in excess morbidity in diarrhea (%) with 95% eCI by prefecture and period under the RCP6.0 scenario. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017; Vicedo-Cabrera et al. 2019). Estimates are presented as GCM-ensemble average decadal fractions. RCP=representative concentration pathway; GCM=general circulation model.

		RCP6.0		
		2010–2019	2050–2059	2090–2099
Aichi	Heat	6.7 (5.4, 7.9)	7.8 (6.3, 9.1)	9.4 (7.2, 11.5)
	Cold	65.8 (59.4, 69.9)	62.8 (56.4, 67.1)	58.8 (52.1, 63.9)
	Net	-	-1.9 (-3.1, -0.3)	-4.3 (-6.3, -2.3)
Akita	Heat	5.6 (4.2, 6.7)	6.6 (5.0, 7.9)	8.1 (6.1, 10.0)
	Cold	68.5 (62.8, 72.4)	65.7 (59.8, 69.6)	61.2 (54.4, 66.3)
	Net	-	-1.8 (-3.0, -0.4)	-4.8 (-7.5, -2.5)
Aomori	Heat	3.9 (2.3, 5.1)	4.6 (2.8, 6.1)	6.0 (3.6, 7.9)
	Cold	70.6 (61.9, 75.7)	67.9 (59.2, 73.1)	63.1 (53.7, 69.6)
	Net	-	-2.0 (-3.2, -0.4)	-5.4 (-9.1, -2.6)
Chiba	Heat	6.0 (4.9, 6.9)	7.0 (5.7, 8.2)	8.5 (6.8, 10.4)
	Cold	72.3 (68.8, 74.9)	69.1 (64.6, 72.2)	64.7 (59.6, 69.2)
	Net	-	-2.2 (-4.0, -0.5)	-5.1 (-7.4, -2.7)
Ehime	Heat	6.4 (5.2, 7.4)	7.4 (6.1, 8.6)	9.1 (7.3, 11.1)
	Cold	65.5 (59.8, 69.3)	62.1 (56.3, 66.2)	57.5 (51.1, 62.8)
	Net	-	-2.3 (-3.1, -1.0)	-5.2 (-7.2, -3.1)
Fukui	Heat	5.5 (4.3, 6.5)	6.3 (4.8, 7.5)	7.4 (5.5, 9.1)
	Cold	60.1 (53.0, 65.0)	57.2 (50.4, 62.0)	53.1 (46.1, 58.9)
	Net	-	-2.2 (-2.8, -1.0)	-5.2 (-6.9, -3.2)
Fukuoka	Heat	5.3 (4.0, 6.6)	6.4 (4.8, 7.9)	8.0 (5.7, 10.4)
	Cold	53.2 (43.7, 60.2)	49.3 (39.7, 56.4)	44.2 (34.6, 52.1)
	Net	-	-2.8 (-4.5, -0.8)	-6.3 (-9.1, -3.6)
Fukushima	Heat	5.5 (4.3, 6.5)	6.4 (5.1, 7.6)	8.0 (6.1, 10.2)
	Cold	67.5 (61.9, 71.2)	64.4 (58.5, 68.6)	60.4 (54.0, 65.4)
	Net	-	-2.2 (-3.9, -0.2)	-4.6 (-6.7, -2.3)
Gifu	Heat	6.1 (4.6, 7.3)	7.0 (5.4, 8.5)	8.5 (6.3, 10.7)
	Cold	60.1 (51.1, 66.2)	57.1 (48.2, 63.3)	53.0 (43.8, 59.8)
	Net	-	-2.1 (-3.2, -0.4)	-4.7 (-6.7, -2.5)
Gunma	Heat	6.2 (5.1, 7.1)	7.2 (5.9, 8.3)	8.7 (7.0, 10.7)

	Cold	68.3 (64.3, 71.2)	65.3 (60.8, 68.7)	61.3 (56.1, 65.7)
	Net	-	-2.0 (-3.4, -0.2)	-4.5 (-6.4, -2.3)
Hiroshima	Heat	5.6 (4.3, 6.7)	6.5 (5.0, 7.8)	7.9 (6.0, 10.0)
	Cold	57.3 (48.7, 63.1)	54.2 (45.8, 60.0)	49.8 (41.2, 56.5)
	Net	-	-2.2 (-2.9, -1.0)	-5.1 (-7.0, -3.2)
Hokkaido	Heat	4.3 (1.5, 6.4)	5.5 (2.0, 8.1)	7.5 (2.8, 10.8)
	Cold	57.9 (44.6, 65.2)	55.0 (42.0, 62.5)	50.0 (37.7, 58.5)
	Net	-	-1.7 (-3.5, 0.3)	-4.6 (-8.8, -1.7)
Hyogo	Heat	5.1 (3.7, 6.3)	6.2 (4.5, 7.6)	7.8 (5.5, 10.1)
	Cold	53.4 (44.0, 59.9)	49.9 (40.6, 56.4)	45.4 (36.1, 52.6)
	Net	-	-2.4 (-3.7, -0.8)	-5.3 (-7.4, -3.2)
Ibaraki	Heat	4.4 (3.1, 5.6)	5.3 (3.7, 6.7)	6.7 (4.5, 8.8)
	Cold	67.1 (61.3, 70.9)	64.3 (58.3, 68.6)	60.3 (53.8, 65.7)
	Net	-	-1.9 (-3.6, -0.1)	-4.5 (-7.0, -2.1)
Ishikawa	Heat	4.7 (3.7, 5.6)	5.6 (4.4, 6.6)	6.8 (5.2, 8.5)
	Cold	62.2 (54.5, 67.4)	58.6 (50.8, 64.1)	53.8 (45.7, 60.0)
	Net	-	-2.8 (-4.3, -0.7)	-6.3 (-8.6, -3.9)
Iwate	Heat	5.6 (4.1, 6.9)	6.6 (4.8, 8.1)	8.3 (6.1, 10.4)
	Cold	68.4 (61.6, 72.6)	65.8 (58.8, 70.2)	61.7 (53.9, 67.1)
	Net	-	-1.6 (-3.1, -0.1)	-4.0 (-7.0, -1.6)
Kagawa	Heat	6.0 (4.6, 7.3)	7.0 (5.3, 8.4)	8.4 (6.3, 10.4)
	Cold	56.7 (47.1, 62.8)	53.2 (43.9, 59.4)	48.7 (39.3, 55.7)
	Net	-	-2.5 (-3.7, -1.0)	-5.7 (-7.6, -3.5)
Kagoshima	Heat	6.5 (5.1, 7.7)	7.8 (6.1, 9.4)	9.8 (7.3, 12.0)
	Cold	60.4 (53.3, 65.2)	56.3 (48.6, 61.8)	51.0 (42.8, 58.1)
	Net	-	-2.8 (-4.8, -0.8)	-6.1 (-8.9, -3.1)
Kanagawa	Heat	5.7 (4.4, 6.8)	6.6 (5.1, 7.9)	8.0 (5.9, 9.9)
	Cold	71.8 (67.5, 74.7)	68.6 (64.2, 71.7)	64.2 (59.0, 68.7)
	Net	-	-2.3 (-3.4, -1.1)	-5.4 (-7.5, -3.1)
Kochi	Heat	4.7 (3.5, 5.6)	5.4 (3.9, 6.5)	6.5 (4.6, 8.1)
	Cold	63.7 (55.3, 69.0)	60.3 (52.0, 65.9)	55.5 (46.8, 62.2)
	Net	-	-2.6 (-3.6, -1.2)	-6.4 (-8.4, -3.9)
Kumamoto	Heat	5.7 (4.3, 7.0)	6.7 (5.0, 8.1)	8.0 (5.8, 9.9)
	Cold	52.8 (43.1, 59.4)	49.8 (40.2, 56.4)	45.7 (36.2, 53.2)
	Net	-	-2.0 (-3.0, -1.0)	-4.8 (-6.8, -2.6)
Kyoto	Heat	6.4 (5.1, 7.6)	7.4 (5.9, 8.8)	9.0 (6.9, 11.2)
	Cold	57.4 (49.9, 62.9)	54.0 (46.6, 59.6)	49.7 (42.1, 55.8)
	Net	-	-2.4 (-3.5, -0.5)	-5.1 (-7.1, -3.0)
Mie	Heat	6.2 (5.0, 7.2)	7.2 (5.9, 8.4)	8.6 (6.9, 10.4)
	Cold	65.3 (60.3, 69.2)	62.2 (56.8, 66.3)	58.0 (52.1, 62.9)
	Net	-	-2.2 (-3.3, -0.6)	-5.0 (-6.7, -3.0)

Miyagi	Heat	5.2 (3.8, 6.4)	6.1 (4.5, 7.5)	7.6 (5.5, 9.8)
	Cold	69.1 (64.2, 72.5)	66.0 (60.6, 69.7)	61.5 (55.4, 66.4)
	Net	-	-2.2 (-3.9, -0.3)	-5.1 (-7.7, -2.6)
Miyazaki	Heat	3.4 (1.7, 4.7)	3.9 (1.9, 5.5)	4.8 (1.9, 6.9)
	Cold	49.2 (37.6, 57.0)	46.0 (34.8, 53.7)	41.6 (30.6, 49.8)
	Net	-	-2.6 (-3.8, -1.3)	-6.2 (-8.7, -3.6)
Nagano	Heat	5.9 (4.6, 7.1)	7.0 (5.4, 8.5)	8.8 (6.6, 11.2)
	Cold	59.8 (52.3, 65.1)	57.0 (49.5, 62.3)	53.3 (45.6, 59.0)
	Net	-	-1.8 (-2.8, -0.1)	-3.6 (-5.4, -1.8)
Nagasaki	Heat	4.8 (3.7, 5.8)	5.8 (4.4, 6.9)	7.3 (5.4, 9.1)
	Cold	66.0 (58.3, 70.9)	62.2 (54.3, 67.6)	56.9 (48.3, 63.6)
	Net	-	-2.8 (-4.4, -1.0)	-6.6 (-9.2, -4.0)
Nara	Heat	5.4 (4.2, 6.3)	6.1 (4.7, 7.3)	7.3 (5.6, 8.8)
	Cold	65.5 (59.2, 69.7)	62.4 (56.0, 66.8)	58.0 (51.3, 63.7)
	Net	-	-2.4 (-3.1, -1.2)	-5.5 (-7.4, -3.2)
Niigata	Heat	4.6 (3.7, 5.4)	5.4 (4.4, 6.3)	6.7 (5.3, 8.4)
	Cold	69.2 (63.7, 73.1)	65.4 (59.4, 69.7)	60.4 (53.8, 65.6)
	Net	-	-3.0 (-4.7, -0.7)	-6.7 (-9.0, -4.1)
Oita	Heat	5.1 (3.5, 6.6)	6.0 (4.1, 7.6)	7.3 (4.7, 9.5)
	Cold	52.2 (42.8, 58.5)	48.9 (39.8, 55.1)	44.4 (35.3, 51.6)
	Net	-	-2.4 (-3.2, -1.2)	-5.7 (-7.7, -3.4)
Okayama	Heat	6.2 (5.0, 7.3)	7.3 (5.8, 8.6)	8.9 (6.8, 11.1)
	Cold	56.3 (49.6, 61.2)	53.3 (46.7, 58.1)	49.1 (42.1, 54.8)
	Net	-	-2.0 (-2.8, -0.7)	-4.6 (-6.5, -2.8)
Okinawa	Heat	-4.0 (-27.1, 2.8)	-7.5 (-61.5, 4.8)	-15.1 (-185.8, 8.2)
	Cold	41.5 (-1.4, 60.2)	38.5 (-2.2, 56.6)	35.0 (-3.1, 52.6)
	Net	-	-6.6 (-38.1, 0.2)	-17.6 (-164.4, 0.9)
Osaka	Heat	6.4 (4.8, 7.8)	7.5 (5.6, 9.1)	9.0 (6.5, 11.4)
	Cold	57.8 (49.4, 63.6)	54.3 (46.0, 60.3)	49.8 (41.5, 56.4)
	Net	-	-2.4 (-3.7, -0.6)	-5.3 (-7.5, -3.0)
Saga	Heat	4.2 (3.4, 4.9)	4.7 (3.8, 5.6)	5.7 (4.3, 6.9)
	Cold	68.3 (59.3, 73.9)	64.7 (55.5, 70.6)	59.5 (49.9, 67.0)
	Net	-	-3.0 (-4.1, -1.6)	-7.3 (-9.6, -4.5)
Saitama	Heat	6.7 (5.7, 7.6)	7.8 (6.6, 8.9)	9.4 (7.7, 11.2)
	Cold	70.3 (67.0, 72.8)	67.5 (63.5, 70.5)	63.7 (59.2, 67.7)
	Net	-	-1.8 (-3.1, -0.2)	-4.0 (-5.8, -2.0)
Shiga	Heat	6.0 (4.8, 7.0)	7.1 (5.7, 8.4)	8.7 (6.7, 10.7)
	Cold	64.7 (59.2, 68.6)	61.3 (55.6, 65.5)	56.9 (50.8, 61.8)
	Net	-	-2.3 (-3.4, -0.6)	-5.1 (-7.0, -3.1)
Shimane	Heat	5.1 (3.5, 6.5)	6.1 (4.2, 7.8)	7.7 (5.1, 10.2)
	Cold	50.0 (39.6, 57.0)	46.4 (36.3, 53.4)	41.8 (31.6, 49.4)

	Net	-	-2.5 (-3.3, -1.1)	-5.7 (-7.9, -3.7)
Shizuoka	Heat	6.3 (4.8, 7.5)	7.6 (5.8, 9.1)	9.4 (6.9, 11.7)
	Cold	68.5 (64.3, 71.5)	65.2 (60.5, 68.6)	60.8 (55.5, 65.4)
	Net	-	-2.0 (-3.4, -0.6)	-4.6 (-7.0, -2.3)
Tochigi	Heat	4.1 (3.2, 5.0)	4.9 (3.8, 5.8)	6.0 (4.5, 7.6)
	Cold	72.7 (67.5, 76.1)	70.2 (65.0, 73.8)	66.6 (60.9, 71.0)
	Net	-	-1.8 (-2.7, -0.6)	-4.2 (-5.8, -2.5)
Tokushima	Heat	5.3 (4.0, 6.5)	6.3 (4.7, 7.7)	7.9 (5.7, 10.3)
	Cold	60.4 (53.0, 65.7)	56.9 (49.2, 62.8)	52.3 (44.1, 59.0)
	Net	-	-2.5 (-4.4, -0.2)	-5.5 (-8.0, -2.9)
Tokyo	Heat	6.2 (3.2, 8.3)	7.2 (3.6, 9.6)	8.8 (4.0, 12.0)
	Cold	68.6 (56.2, 74.1)	65.9 (54.3, 71.6)	61.9 (50.6, 68.4)
	Net	-	-1.6 (-3.6, 0.4)	-4.1 (-7.5, -0.5)
Tottori	Heat	6.2 (4.7, 7.4)	7.4 (5.7, 8.8)	9.1 (6.8, 11.4)
	Cold	59.0 (51.2, 64.3)	55.2 (47.1, 60.7)	50.2 (42.0, 56.4)
	Net	-	-2.7 (-4.1, -0.5)	-6.0 (-8.1, -3.6)
Toyama	Heat	6.2 (5.1, 7.2)	7.3 (6.0, 8.5)	8.8 (7.0, 10.9)
	Cold	66.3 (61.2, 70.0)	62.8 (57.5, 66.6)	58.2 (52.4, 62.9)
	Net	-	-2.5 (-3.6, -0.9)	-5.6 (-7.2, -3.7)
Wakayama	Heat	4.2 (2.9, 5.4)	5.0 (3.5, 6.3)	6.2 (4.2, 8.2)
	Cold	57.2 (46.2, 64.8)	53.9 (42.9, 61.5)	49.3 (38.4, 57.4)
	Net	-	-2.6 (-3.9, -0.8)	-5.8 (-8.0, -3.5)
Yamagata	Heat	5.1 (3.8, 6.1)	5.9 (4.4, 7.2)	7.2 (5.3, 9.1)
	Cold	65.8 (58.3, 70.4)	62.8 (55.4, 67.5)	58.8 (51.1, 64.2)
	Net	-	-2.2 (-2.8, -1.1)	-4.9 (-6.4, -3.2)
Yamaguchi	Heat	6.3 (5.2, 7.2)	7.4 (6.2, 8.6)	9.2 (7.3, 11.3)
	Cold	65.1 (59.6, 68.9)	61.6 (55.3, 66.1)	56.6 (49.6, 62.5)
	Net	-	-2.4 (-4.6, -0.3)	-5.6 (-8.5, -2.9)
Yamanashi	Heat	5.0 (3.8, 6.1)	5.8 (4.4, 7.1)	7.2 (5.3, 9.2)
	Cold	57.5 (48.2, 64.2)	54.6 (45.4, 61.5)	50.7 (41.3, 58.1)
	Net	-	-2.1 (-3.4, -0.2)	-4.6 (-6.6, -2.3)

Table S5. Heat-related, cold-related, and net change in excess morbidity in diarrhea (%) with 95% eCI by prefecture and period under the RCP8.5 scenario. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017; Vicedo-Cabrera et al. 2019). Estimates are presented as GCM-ensemble average decadal fractions. GCM=general circulation model; RCP=representative concentration pathway.

		RCP8.5		
		2010–2019	2050–2059	2090–2099
Aichi	Heat	6.8 (5.5, 7.8)	8.6 (6.8, 10.2)	11.0 (8.2, 13.3)
	Cold	65.2 (59.1, 69.3)	60.6 (54.2, 65.2)	52.9 (44.8, 61.2)
	Net	-	-2.7 (-4.4, -1.3)	-8.1 (-12.1, -3.5)
Akita	Heat	5.7 (4.3, 6.9)	7.4 (5.6, 9.0)	9.8 (7.1, 11.9)
	Cold	68.1 (62.3, 71.9)	63.3 (57.3, 67.8)	55.8 (48.2, 63.3)
	Net	-	-3.1 (-5.4, -1.1)	-8.2 (-12.8, -3.7)
Aomori	Heat	3.9 (2.3, 5.3)	5.4 (3.2, 7.1)	7.5 (4.4, 9.8)
	Cold	70.2 (61.5, 75.2)	65.3 (56.4, 71.0)	57.3 (47.4, 66.1)
	Net	-	-3.5 (-6.4, -1.2)	-9.4 (-15.1, -3.9)
Chiba	Heat	6.1 (5.0, 7.0)	7.7 (6.3, 9.2)	9.9 (7.6, 11.9)
	Cold	71.7 (68.3, 74.1)	66.7 (62.1, 70.1)	58.6 (51.1, 66.3)
	Net	-	-3.3 (-5.7, -1.7)	-9.2 (-14.7, -4.1)
Ehime	Heat	6.5 (5.3, 7.4)	8.5 (6.9, 9.9)	11.0 (8.5, 13.0)
	Cold	64.8 (59.1, 68.7)	59.5 (53.2, 64.1)	51.0 (43.1, 59.0)
	Net	-	-3.3 (-5.5, -1.8)	-9.2 (-13.5, -4.6)
Fukui	Heat	5.6 (4.4, 6.6)	7.0 (5.3, 8.5)	8.7 (6.2, 10.9)
	Cold	59.5 (52.6, 64.3)	54.8 (47.9, 60.1)	47.4 (39.4, 55.3)
	Net	-	-3.3 (-5.4, -1.9)	-9.0 (-12.9, -4.7)
Fukuoka	Heat	5.5 (4.1, 6.7)	7.2 (5.3, 9.0)	9.6 (6.6, 12.2)
	Cold	52.7 (43.4, 59.6)	46.7 (37.1, 53.9)	37.9 (27.8, 48.6)
	Net	-	-4.2 (-6.7, -2.2)	-10.6 (-15.4, -5.0)
Fukushima	Heat	5.5 (4.4, 6.5)	7.1 (5.6, 8.5)	9.5 (7.0, 11.5)
	Cold	67.1 (61.5, 70.8)	62.5 (56.7, 66.6)	55.2 (47.8, 62.6)
	Net	-	-3.0 (-4.9, -1.6)	-7.9 (-11.8, -3.8)
Gifu	Heat	6.1 (4.7, 7.2)	7.8 (5.9, 9.5)	10.0 (7.2, 12.4)
	Cold	59.6 (50.6, 65.6)	54.8 (45.8, 61.2)	47.3 (37.3, 56.8)
	Net	-	-3.1 (-4.9, -1.6)	-8.4 (-12.5, -3.7)
Gunma	Heat	6.2 (5.2, 7.1)	7.9 (6.5, 9.3)	10.2 (7.8, 12.2)

	Cold	67.8 (63.8, 70.7)	63.3 (58.7, 66.8)	55.6 (48.8, 63.0)
	Net	-	-2.9 (-4.6, -1.7)	-8.2 (-12.3, -3.8)
Hiroshima	Heat	5.6 (4.4, 6.7)	7.3 (5.6, 8.9)	9.6 (7.0, 11.7)
	Cold	56.8 (48.2, 62.6)	51.8 (43.2, 58.0)	44.0 (34.6, 53.0)
	Net	-	-3.3 (-5.3, -1.9)	-8.8 (-12.9, -4.5)
Hokkaido	Heat	4.4 (1.6, 6.6)	6.5 (2.4, 9.5)	9.4 (3.4, 13.3)
	Cold	57.5 (44.0, 64.8)	52.2 (39.6, 60.0)	44.3 (32.7, 53.5)
	Net	-	-3.3 (-6.5, -0.8)	-8.3 (-13.5, -3.7)
Hyogo	Heat	5.2 (3.8, 6.3)	7.1 (5.1, 8.8)	9.6 (6.5, 12.0)
	Cold	52.8 (43.2, 59.2)	47.4 (38.1, 54.2)	39.4 (29.6, 49.3)
	Net	-	-3.4 (-5.5, -1.8)	-8.9 (-13.0, -4.1)
Ibaraki	Heat	4.5 (3.2, 5.6)	6.0 (4.1, 7.6)	7.9 (5.0, 10.2)
	Cold	66.7 (61.0, 70.5)	62.3 (56.3, 66.6)	55.0 (47.3, 62.8)
	Net	-	-2.9 (-5.2, -1.5)	-8.2 (-13.1, -3.6)
Ishikawa	Heat	4.8 (3.8, 5.6)	6.2 (4.8, 7.5)	8.1 (5.9, 10.0)
	Cold	61.6 (54.1, 66.8)	56.2 (48.4, 61.8)	47.5 (38.4, 56.8)
	Net	-	-4.1 (-6.4, -2.3)	-10.8 (-15.3, -5.3)
Iwate	Heat	5.8 (4.1, 7.1)	7.6 (5.6, 9.3)	10.1 (7.2, 12.4)
	Cold	68.0 (61.1, 72.1)	63.4 (56.4, 68.3)	56.7 (48.3, 64.0)
	Net	-	-2.7 (-5.0, -0.7)	-6.9 (-11.4, -2.9)
Kagawa	Heat	6.1 (4.7, 7.3)	7.8 (5.9, 9.4)	10.0 (7.2, 12.4)
	Cold	56.0 (46.6, 62.2)	50.7 (41.4, 57.2)	42.5 (32.6, 52.0)
	Net	-	-3.7 (-5.7, -2.1)	-9.6 (-13.6, -4.9)
Kagoshima	Heat	6.5 (5.2, 7.7)	8.8 (6.8, 10.7)	11.7 (8.5, 14.2)
	Cold	59.7 (52.6, 64.6)	53.4 (45.6, 59.2)	44.3 (34.6, 54.3)
	Net	-	-4.0 (-6.8, -1.8)	-10.2 (-15.8, -4.3)
Kanagawa	Heat	5.8 (4.5, 6.8)	7.5 (5.7, 9.0)	9.5 (6.7, 11.8)
	Cold	71.2 (66.9, 74.1)	66.1 (61.1, 69.7)	57.2 (49.7, 65.0)
	Net	-	-3.4 (-5.7, -2.1)	-10.2 (-15.1, -5.1)
Kochi	Heat	4.7 (3.5, 5.6)	6.1 (4.4, 7.5)	8.0 (5.4, 10.0)
	Cold	63.1 (54.9, 68.5)	57.3 (49.0, 63.2)	48.8 (39.3, 57.8)
	Net	-	-4.4 (-6.6, -2.7)	-11.0 (-15.5, -6.0)
Kumamoto	Heat	5.8 (4.4, 7.1)	7.6 (5.5, 9.2)	9.9 (6.8, 12.3)
	Cold	52.4 (42.6, 58.9)	47.3 (37.8, 54.2)	40.2 (30.0, 49.2)
	Net	-	-3.4 (-5.3, -1.8)	-8.2 (-12.5, -3.9)
Kyoto	Heat	6.5 (5.3, 7.6)	8.3 (6.5, 9.9)	10.6 (7.9, 13.1)
	Cold	56.8 (49.4, 62.2)	51.7 (44.2, 57.5)	43.8 (35.4, 52.7)
	Net	-	-3.3 (-5.1, -1.8)	-8.8 (-12.5, -4.3)
Mie	Heat	6.2 (5.1, 7.1)	7.9 (6.5, 9.3)	10.1 (7.8, 12.1)
	Cold	64.7 (59.6, 68.6)	59.8 (54.1, 64.1)	51.7 (44.1, 59.9)
	Net	-	-3.2 (-5.2, -1.8)	-9.1 (-13.4, -4.3)

Miyagi	Heat	5.3 (3.9, 6.5)	6.9 (5.1, 8.4)	9.1 (6.3, 11.3)
	Cold	68.6 (63.7, 72.0)	63.7 (58.4, 67.8)	56.0 (48.7, 63.5)
	Net	-	-3.3 (-5.6, -1.3)	-8.8 (-13.9, -3.9)
Miyazaki	Heat	3.4 (1.8, 4.7)	4.5 (2.0, 6.3)	5.9 (1.9, 8.8)
	Cold	48.8 (37.4, 56.5)	43.3 (32.3, 51.1)	35.7 (24.7, 45.5)
	Net	-	-4.4 (-7.0, -2.6)	-10.6 (-16.0, -5.3)
Nagano	Heat	6.0 (4.7, 7.2)	7.9 (6.0, 9.5)	10.5 (7.7, 12.8)
	Cold	59.3 (51.9, 64.6)	55.1 (47.8, 60.3)	48.6 (40.3, 56.3)
	Net	-	-2.4 (-3.7, -1.2)	-6.3 (-9.5, -2.8)
Nagasaki	Heat	4.9 (3.8, 5.7)	6.6 (5.0, 8.0)	8.9 (6.3, 10.9)
	Cold	65.3 (57.8, 70.3)	59.2 (51.0, 65.1)	49.7 (39.8, 60.1)
	Net	-	-4.3 (-7.0, -2.3)	-11.5 (-16.8, -5.3)
Nara	Heat	5.4 (4.2, 6.4)	6.9 (5.3, 8.4)	8.9 (6.5, 11.0)
	Cold	64.8 (58.6, 69.1)	59.7 (53.0, 64.6)	51.9 (43.6, 59.9)
	Net	-	-3.6 (-5.8, -2.0)	-9.4 (-13.6, -4.9)
Niigata	Heat	4.7 (3.8, 5.4)	6.0 (4.8, 7.1)	8.1 (6.1, 9.7)
	Cold	68.6 (63.2, 72.4)	63.1 (57.3, 67.5)	54.3 (46.6, 62.4)
	Net	-	-4.2 (-6.4, -2.2)	-10.9 (-15.1, -5.6)
Oita	Heat	5.2 (3.6, 6.6)	6.8 (4.5, 8.6)	8.8 (5.4, 11.5)
	Cold	51.6 (42.3, 57.9)	46.3 (37.2, 52.9)	38.2 (28.7, 47.4)
	Net	-	-3.8 (-6.0, -2.2)	-9.8 (-14.3, -5.0)
Okayama	Heat	6.3 (5.1, 7.3)	8.1 (6.4, 9.8)	10.6 (7.8, 12.9)
	Cold	55.8 (49.1, 60.7)	51.0 (44.2, 56.3)	43.4 (35.4, 51.6)
	Net	-	-2.9 (-4.8, -1.6)	-8.1 (-12.0, -4.0)
Okinawa	Heat	-3.9 (-26.5, 2.8)	-11.7 (-121.4, 6.6)	-29.8 (-632.2, 12.2)
	Cold	41.3 (-1.8, 60.1)	36.4 (-2.7, 54.2)	30.8 (-3.5, 48.5)
	Net	-	-12.8 (-101.7, 1.0)	-36.4 (-622.7, 1.9)
Osaka	Heat	6.4 (4.9, 7.7)	8.3 (6.2, 10.2)	10.8 (7.5, 13.5)
	Cold	57.1 (48.7, 62.9)	51.9 (43.5, 58.0)	43.5 (34.3, 53.0)
	Net	-	-3.4 (-5.5, -1.8)	-9.3 (-13.6, -4.5)
Saga	Heat	4.2 (3.4, 4.9)	5.3 (4.1, 6.4)	7.0 (5.1, 8.7)
	Cold	67.7 (58.9, 73.3)	61.6 (52.0, 68.3)	52.4 (41.2, 62.9)
	Net	-	-5.0 (-7.7, -2.8)	-12.6 (-18.0, -6.7)
Saitama	Heat	6.8 (5.8, 7.6)	8.5 (7.2, 9.9)	10.9 (8.6, 12.8)
	Cold	69.8 (66.5, 72.3)	65.5 (61.4, 68.6)	58.4 (52.0, 65.1)
	Net	-	-2.6 (-4.3, -1.4)	-7.3 (-11.4, -3.3)
Shiga	Heat	6.1 (4.9, 7.0)	8.0 (6.3, 9.4)	10.3 (7.7, 12.4)
	Cold	64.0 (58.4, 67.9)	58.9 (53.0, 63.4)	50.6 (43.1, 58.7)
	Net	-	-3.2 (-5.5, -1.6)	-9.1 (-13.1, -4.2)
Shimane	Heat	5.2 (3.6, 6.6)	6.9 (4.7, 8.9)	9.3 (6.0, 12.0)
	Cold	49.3 (38.9, 56.4)	43.8 (33.6, 51.1)	35.9 (25.7, 45.5)

	Net	-	-3.8 (-6.2, -1.9)	-9.3 (-13.7, -4.7)
Shizuoka	Heat	6.4 (4.9, 7.5)	8.6 (6.4, 10.4)	11.2 (7.8, 13.8)
	Cold	67.8 (63.6, 70.8)	62.7 (57.6, 66.6)	54.2 (46.5, 62.4)
	Net	-	-2.9 (-5.3, -1.2)	-8.7 (-14.2, -3.4)
Tochigi	Heat	4.2 (3.3, 5.0)	5.5 (4.2, 6.7)	7.4 (5.3, 9.1)
	Cold	72.2 (67.2, 75.6)	68.2 (62.7, 72.0)	61.2 (53.9, 68.3)
	Net	-	-2.7 (-4.3, -1.5)	-7.8 (-11.5, -3.8)
Tokushima	Heat	5.3 (4.0, 6.5)	7.0 (5.2, 8.7)	9.4 (6.6, 12.0)
	Cold	59.9 (52.5, 65.2)	54.6 (46.9, 60.3)	46.3 (37.2, 55.5)
	Net	-	-3.6 (-5.9, -1.8)	-9.4 (-14.2, -4.4)
Tokyo	Heat	6.3 (3.3, 8.2)	8.0 (3.9, 10.7)	10.3 (4.1, 14.0)
	Cold	68.3 (56.1, 73.6)	63.9 (52.7, 69.6)	56.1 (43.9, 65.4)
	Net	-	-2.6 (-5.4, -0.3)	-8.1 (-14.8, -2.9)
Tottori	Heat	6.3 (4.9, 7.5)	8.2 (6.2, 9.9)	10.8 (7.8, 13.2)
	Cold	58.5 (50.7, 63.6)	52.8 (45.0, 58.2)	44.1 (35.1, 53.2)
	Net	-	-3.9 (-5.7, -2.2)	-9.9 (-13.9, -5.0)
Toyama	Heat	6.3 (5.3, 7.2)	8.1 (6.6, 9.6)	10.4 (8.0, 12.5)
	Cold	65.6 (60.6, 69.3)	60.4 (54.6, 64.7)	52.0 (44.7, 59.9)
	Net	-	-3.6 (-5.5, -2.0)	-9.5 (-13.3, -5.0)
Wakayama	Heat	4.2 (3.0, 5.4)	5.7 (3.9, 7.2)	7.6 (5.0, 9.9)
	Cold	56.6 (45.5, 64.1)	51.3 (40.3, 59.0)	43.3 (32.1, 53.7)
	Net	-	-3.9 (-6.2, -2.2)	-9.9 (-14.3, -4.8)
Yamagata	Heat	5.2 (3.9, 6.2)	6.7 (4.9, 8.2)	8.7 (6.2, 10.8)
	Cold	65.1 (57.7, 69.8)	60.6 (53.0, 65.7)	53.6 (45.1, 60.9)
	Net	-	-3.1 (-4.8, -1.8)	-8.0 (-11.2, -4.3)
Yamaguchi	Heat	6.4 (5.3, 7.3)	8.3 (6.8, 9.7)	11.0 (8.4, 12.9)
	Cold	64.6 (59.2, 68.5)	59.0 (52.9, 63.9)	50.5 (42.4, 59.2)
	Net	-	-3.7 (-6.1, -1.7)	-9.6 (-14.4, -4.4)
Yamanashi	Heat	5.0 (3.8, 6.1)	6.5 (4.8, 8.0)	8.5 (6.1, 10.7)
	Cold	57.1 (47.8, 63.7)	52.5 (43.3, 59.3)	45.5 (35.7, 54.8)
	Net	-	-3.1 (-4.8, -1.8)	-8.1 (-11.9, -3.8)

Table S6. Prefecture-specific attributable fractions (95% eCI) for infectious gastroenteritis in 2010–2019. Attributable fractions were computed as total and as separate components for cold and heat.

Prefecture	Minimum morbidity percentile	Minimum morbidity temperature (°C)	Total (%)		Cold (%)		Heat (%)	
Hokkaido	75th	18.2	61.9	(47.5, 70.0)	57.5	(44.0, 64.8)	4.4	(1.6, 6.6)
Aomori	75th	18.8	74.2	(64.8, 79.6)	70.2	(61.5, 75.2)	3.9	(2.3, 5.3)
Iwate	73rd	18.6	73.7	(66.3, 78.3)	68.0	(61.1, 72.1)	5.8	(4.1, 7.1)
Miyagi	73rd	19.7	73.8	(68.3, 77.5)	68.6	(63.7, 72.0)	5.3	(3.9, 6.5)
Akita	72nd	19.7	73.8	(67.5, 78.0)	68.1	(62.3, 71.9)	5.7	(4.3, 6.9)
Yamagata	73rd	20.3	70.3	(62.3, 75.5)	65.1	(57.7, 69.8)	5.2	(3.9, 6.2)
Fukushima	72nd	20.4	72.6	(66.6, 76.6)	67.1	(61.5, 70.8)	5.5	(4.4, 6.5)
Ibaraki	74th	20.9	71.1	(64.7, 75.4)	66.7	(61.0, 70.5)	4.5	(3.2, 5.6)
Tochigi	73rd	21.2	76.4	(70.9, 80.1)	72.2	(67.2, 75.6)	4.2	(3.3, 5.0)
Gunma	72nd	21.6	74.0	(69.7, 77.1)	67.8	(63.8, 70.7)	6.2	(5.2, 7.1)
Saitama	72nd	22.0	76.6	(72.9, 79.3)	69.8	(66.5, 72.3)	6.8	(5.8, 7.6)
Chiba	73rd	22.2	77.7	(73.8, 80.5)	71.7	(68.3, 74.1)	6.1	(5.0, 7.0)
Tokyo	74th	23.0	74.5	(61.1, 80.5)	68.3	(56.1, 73.6)	6.3	(3.3, 8.2)
Kanagawa	74th	22.4	76.9	(72.1, 80.3)	71.2	(66.9, 74.1)	5.8	(4.5, 6.8)
Niigata	71st	21.0	73.3	(67.4, 77.3)	68.6	(63.2, 72.4)	4.7	(3.8, 5.4)
Toyama	71st	21.0	72.0	(66.4, 75.9)	65.6	(60.6, 69.3)	6.3	(5.3, 7.2)
Ishikawa	72nd	21.5	66.4	(58.3, 71.9)	61.6	(54.1, 66.8)	4.8	(3.8, 5.6)
Fukui	71st	21.6	65.1	(57.6, 70.4)	59.5	(52.6, 64.3)	5.6	(4.4, 6.6)
Yamanashi	70th	21.4	62.1	(52.3, 69.1)	57.1	(47.8, 63.7)	5.0	(3.8, 6.1)
Nagano	72nd	20.2	65.4	(57.4, 70.8)	59.3	(51.9, 64.6)	6.0	(4.7, 7.2)
Gifu	69th	22.5	65.7	(56.4, 71.9)	59.6	(50.6, 65.6)	6.1	(4.7, 7.2)
Shizuoka	73rd	22.9	74.2	(69.3, 77.6)	67.8	(63.6, 70.8)	6.4	(4.9, 7.5)
Aichi	70th	22.7	72.0	(65.1, 76.4)	65.2	(59.1, 69.3)	6.8	(5.5, 7.8)
Mie	72nd	22.7	70.9	(65.5, 75.0)	64.7	(59.6, 68.6)	6.2	(5.1, 7.1)
Shiga	73rd	22.2	70.0	(63.9, 74.4)	64.0	(58.4, 67.9)	6.1	(4.9, 7.0)
Kyoto	70th	22.6	63.3	(55.4, 69.0)	56.8	(49.4, 62.2)	6.5	(5.3, 7.6)

Osaka	70th	23.1	63.6	(54.7,	69.7)	57.1	(48.7,	62.9)	6.4	(4.9, 7.7)
Hyogo	71st	23.3	57.9	(47.8,	64.9)	52.8	(43.2,	59.2)	5.2	(3.8, 6.3)
Nara	72nd	21.9	70.3	(63.3,	75.0)	64.8	(58.6,	69.1)	5.4	(4.2, 6.4)
Wakayama	73rd	23.3	60.8	(49.1,	68.8)	56.6	(45.5,	64.1)	4.2	(3.0, 5.4)
Tottori	73rd	21.7	64.8	(56.2,	70.4)	58.5	(50.7,	63.6)	6.3	(4.9, 7.5)
Shimane	72nd	21.3	54.5	(43.2,	62.1)	49.3	(38.9,	56.4)	5.2	(3.6, 6.6)
Okayama	70th	22.8	62.1	(54.7,	67.3)	55.8	(49.1,	60.7)	6.3	(5.1, 7.3)
Hiroshima	69th	22.4	62.5	(53.2,	68.6)	56.8	(48.2,	62.6)	5.6	(4.4, 6.7)
Yamaguchi	71st	22.1	71.0	(65.1,	75.1)	64.6	(59.2,	68.5)	6.4	(5.3, 7.3)
Tokushima	72nd	23.0	65.2	(57.1,	70.9)	59.9	(52.5,	65.2)	5.3	(4.0, 6.5)
Kagawa	70th	22.7	62.1	(52.0,	68.6)	56.0	(46.6,	62.2)	6.1	(4.7, 7.3)
Ehime	73rd	23.1	71.2	(65.0,	75.6)	64.8	(59.1,	68.7)	6.5	(5.3, 7.4)
Kochi	71st	23.0	67.8	(58.9,	73.6)	63.1	(54.9,	68.5)	4.7	(3.5, 5.6)
Fukuoka	72nd	23.1	58.1	(48.2,	65.3)	52.7	(43.4,	59.6)	5.5	(4.1, 6.7)
Saga	69th	22.7	71.9	(62.6,	77.8)	67.7	(58.9,	73.3)	4.2	(3.4, 4.9)
Nagasaki	73rd	23.4	70.1	(62.0,	75.6)	65.3	(57.8,	70.3)	4.9	(3.8, 5.7)
Kumamoto	69th	23.0	58.3	(47.9,	65.2)	52.4	(42.6,	58.9)	5.8	(4.4, 7.1)
Oita	72nd	22.6	56.8	(46.5,	63.7)	51.6	(42.3,	57.9)	5.2	(3.6, 6.6)
Miyazaki	73rd	23.4	52.2	(39.7,	60.4)	48.8	(37.4,	56.5)	3.4	(1.8, 4.7)
Kagoshima	71st	23.9	66.2	(58.6,	71.4)	59.7	(52.6,	64.6)	6.5	(5.2, 7.7)
Okinawa	99th	30.0	37.4	(-10.8,	54.6)	41.3	(-1.8,	60.1)	-3.9	(-26.5, 2.8)
Total	72nd		68.3	(62.7,	71.5)	62.5	(57.4,	65.6)	5.7	(4.4, 6.8)

Table S7. Sensitivity analysis using exposure-response curves calculated with uniform daily outcome counts within each week: Prefecture-specific attributable fractions (95% eCI) for infectious gastroenteritis in 2010–2019. Attributable fractions were computed as total and as separate components for cold and heat.

Prefecture	Minimum morbidity percentile	Minimum morbidity temperature (°C)	Total (%)		Cold (%)		Heat (%)	
Hokkaido	69th	16.3	57.1	(50.7, 61.4)	51.7	(45.4, 56.3)	5.4	(3.4, 7.3)
Aomori	75th	18.6	66.3	(60.0, 70.8)	64.1	(57.4, 69.1)	2.2	(1.1, 3.3)
Iwate	70th	17.7	67.3	(62.2, 70.7)	62.3	(57.3, 66.3)	5.0	(3.2, 6.7)
Miyagi	70th	18.8	64.6	(60.4, 67.7)	60.0	(55.5, 63.6)	4.7	(3.3, 6.0)
Akita	68th	18.4	67.3	(63.4, 70.1)	60.9	(56.7, 64.3)	6.4	(4.7, 7.8)
Yamagata	70th	18.9	64.8	(60.6, 67.6)	60.0	(55.7, 63.3)	4.7	(3.4, 6.1)
Fukushima	74th	20.9	69.4	(66.3, 71.8)	66.3	(63.0, 69.2)	3.1	(2.1, 4.1)
Ibaraki	72nd	20.3	64.3	(58.4, 68.1)	60.2	(54.4, 64.2)	4.1	(2.7, 5.4)
Tochigi	69th	20.3	68.4	(63.7, 71.6)	64.2	(59.5, 67.6)	4.2	(3.2, 5.3)
Gunma	69th	20.9	67.6	(64.3, 70.0)	61.4	(58.1, 63.9)	6.2	(5.0, 7.4)
Saitama	70th	21.5	70.4	(67.4, 72.7)	64.5	(61.5, 66.9)	5.9	(4.7, 7.2)
Chiba	71st	21.7	68.4	(64.6, 71.0)	63.3	(59.4, 66.2)	5.1	(4.0, 6.2)
Tokyo	72nd	22.4	69.8	(60.3, 74.4)	64.9	(56.5, 69.5)	4.8	(2.3, 7.0)
Kanagawa	72nd	21.9	72.0	(68.7, 74.3)	66.6	(63.3, 69.1)	5.4	(4.2, 6.7)
Niigata	69th	20.3	68.8	(66.0, 71.1)	64.8	(61.7, 67.8)	4.0	(2.9, 5.0)
Toyama	66th	20.0	63.1	(58.9, 66.1)	55.5	(51.2, 58.9)	7.6	(6.3, 8.8)
Ishikawa	66th	20.0	56.9	(51.9, 60.6)	51.2	(46.0, 55.3)	5.7	(4.5, 6.8)
Fukui	70th	21.2	61.2	(57.8, 63.8)	56.2	(52.5, 59.2)	5.0	(3.9, 6.2)
Yamanashi	66th	20.4	51.6	(45.5, 56.2)	47.0	(40.7, 51.8)	4.6	(3.2, 6.0)
Nagano	67th	18.6	53.4	(46.9, 57.9)	48.0	(41.6, 52.9)	5.4	(3.8, 6.9)
Gifu	68th	22.1	68.7	(65.3, 71.1)	62.4	(58.9, 65.1)	6.3	(5.0, 7.7)
Shizuoka	72nd	22.5	70.2	(67.5, 72.3)	64.7	(61.9, 66.9)	5.5	(4.2, 6.9)
Aichi	69th	22.2	68.0	(63.8, 70.8)	62.2	(58.1, 65.2)	5.8	(4.5, 7.3)
Mie	70th	22.1	68.1	(64.9, 70.3)	62.0	(58.8, 64.6)	6.1	(4.8, 7.3)

Shiga	71st	21.6	62.6	(58.9, | 65.4)	58.3	(54.4, | 61.5)	4.3	(3.1, | 5.5)
Kyoto	66th	21.4	57.2	(53.0, | 60.5)	50.3	(45.8, | 53.7)	7.0	(5.5, | 8.5)
Osaka	69th	22.7	58.8	(53.1, | 62.9)	52.5	(46.9, | 56.8)	6.4	(4.9, | 7.9)
Hyogo	70th	23.0	51.6	(45.6, | 56.4)	47.6	(41.3, | 52.6)	4.0	(2.5, | 5.5)
Nara	68th	20.7	61.8	(56.1, | 65.8)	55.9	(50.0, | 60.2)	5.9	(4.6, | 7.3)
Wakayama	74th	23.6	65.7	(61.7, | 68.8)	62.2	(57.9, | 65.7)	3.4	(2.3, | 4.5)
Tottori	73rd	21.9	62.9	(59.8, | 65.4)	59.9	(56.7, | 62.7)	3.0	(1.5, | 4.3)
Shimane	68th	20.4	48.4	(42.3, | 52.7)	42.4	(36.3, | 47.3)	6.0	(4.5, | 7.5)
Okayama	66th	21.7	60.0	(56.4, | 62.8)	51.9	(48.1, | 55.0)	8.1	(6.9, | 9.5)
Hiroshima	68th	22.1	62.0	(57.8, | 65.2)	56.7	(52.3, | 60.3)	5.3	(4.0, | 6.6)
Yamaguchi	69th	21.6	69.6	(67.4, | 71.4)	63.8	(61.2, | 66.5)	5.8	(4.4, | 6.9)
Tokushima	72nd	23.1	58.6	(53.4, | 62.6)	55.5	(50.1, | 60.0)	3.1	(1.8, | 4.4)
Kagawa	68th	22.2	61.8	(57.8, | 64.7)	55.8	(51.8, | 59.1)	6.0	(4.6, | 7.4)
Ehime	71st	22.7	68.0	(65.4, | 70.0)	62.6	(59.7, | 65.0)	5.4	(4.2, | 6.7)
Kochi	70th	22.9	63.4	(58.5, | 67.0)	59.0	(53.9, | 63.2)	4.3	(3.1, | 5.5)
Fukuoka	70th	22.7	58.2	(53.5, | 62.0)	53.8	(49.0, | 57.6)	4.5	(3.1, | 5.8)
Saga	65th	21.6	68.6	(64.2, | 71.7)	65.5	(61.4, | 68.7)	3.1	(0.4, | 4.6)
Nagasaki	71st	22.8	67.8	(64.1, | 70.5)	64.1	(60.1, | 67.3)	3.7	(2.4, | 4.9)
Kumamoto	70th	23.3	58.9	(54.6, | 62.3)	54.3	(49.8, | 58.0)	4.7	(3.5, | 5.9)
Oita	70th	22.2	52.8	(48.0, | 56.6)	48.5	(43.6, | 52.4)	4.3	(2.7, | 5.9)
Miyazaki	71st	22.9	47.2	(40.7, | 51.9)	45.1	(38.8, | 50.0)	2.2	(0.6, | 3.6)
Kagoshima	72nd	24.4	63.7	(59.5, | 66.9)	59.4	(55.1, | 62.9)	4.3	(2.8, | 5.6)
Okinawa	99th	30.2	36.6	(-3.6, | 58.3)	36.7	(-3.4, | 58.8)	-0.2	(-0.7, | 0.2)
Total	70th		63.6	(60.0, | 66.0)	58.4	(54.6, | 61.2)	5.2	(4.0, | 6.3)

Table S8. Sensitivity analysis with exposure-response curves calculated using weekly data, and a) calibrating the projected time series of daily mean temperature using the observed distribution of daily mean temperature, and b) projecting the time series of daily outcome using uniform distribution of events within a week: Prefecture-specific attributable fractions (95% eCI) for infectious gastroenteritis in 2010–2019. Attributable fractions were computed as total and as separate components for cold and heat.

Prefecture	Minimum morbidity percentile	Minimum morbidity temperature (°C)	Total (%)		Cold (%)		Heat (%)	
Hokkaido	75th	18.2	57.2	(44.4, 64.3)	55.1	(42.5, 62.2)	2.1	(0.4, 3.8)
Aomori	75th	18.8	70.7	(62.1, 75.8)	68.5	(60.2, 73.7)	2.2	(1.1, 3.3)
Iwate	73rd	18.6	69.6	(62.9, 73.7)	65.9	(59.4, 70.1)	3.8	(2.2, 5.2)
Miyagi	73rd	19.7	70.3	(65.5, 73.7)	66.9	(62.3, 70.8)	3.4	(2.2, 4.6)
Akita	72nd	19.7	69.7	(64.1, 73.4)	65.9	(60.5, 69.8)	3.8	(2.5, 5.1)
Yamagata	73rd	20.3	66.2	(59.1, 70.7)	63.0	(56.1, 67.3)	3.3	(2.2, 4.4)
Fukushima	72nd	20.4	69.3	(63.8, 72.8)	65.5	(60.4, 69.3)	3.7	(2.5, 4.9)
Ibaraki	74th	20.9	68.8	(63.1, 72.6)	65.6	(60.2, 69.3)	3.2	(2.1, 4.3)
Tochigi	73rd	21.2	74.0	(69.0, 77.2)	71.1	(66.3, 74.2)	2.9	(2.1, 3.8)
Gunma	72nd	21.6	71.4	(67.6, 74.2)	66.6	(63.0, 69.2)	4.8	(3.8, 6.0)
Saitama	72nd	22.0	73.3	(70.0, 75.8)	68.3	(65.3, 70.7)	5.0	(4.0, 6.1)
Chiba	73rd	22.2	74.3	(70.8, 76.7)	70.1	(66.9, 72.6)	4.2	(3.2, 5.2)
Tokyo	74th	23.0	71.7	(59.9, 76.8)	67.2	(56.2, 72.2)	4.4	(2.1, 6.4)
Kanagawa	74th	22.4	73.8	(69.7, 76.6)	69.8	(65.9, 72.4)	4.0	(2.9, 5.2)
Niigata	71st	21.0	69.4	(64.2, 73.1)	66.5	(61.4, 70.4)	2.9	(2.0, 3.7)
Toyama	71st	21.0	68.7	(63.7, 72.0)	63.7	(59.0, 66.9)	5.0	(3.9, 6.1)
Ishikawa	72nd	21.5	63.6	(56.3, 68.5)	60.2	(53.1, 65.1)	3.5	(2.5, 4.4)
Fukui	71st	21.6	62.3	(55.6, 66.7)	58.1	(51.7, 62.5)	4.2	(3.0, 5.3)
Yamanashi	70th	21.4	59.8	(50.8, 66.2)	56.3	(47.6, 62.5)	3.5	(2.3, 4.8)
Nagano	72nd	20.2	61.0	(54.0, 65.9)	57.3	(50.4, 62.2)	3.7	(2.4, 4.9)
Gifu	69th	22.5	63.3	(54.9, 68.8)	58.7	(50.4, 64.2)	4.7	(3.3, 6.1)
Shizuoka	73rd	22.9	70.6	(66.3, 73.5)	66.1	(62.1, 68.9)	4.5	(3.3, 5.7)

Aichi	70th	22.7	69.0	(62.9,	72.8)	63.8	(58.0,	67.6)	5.1	(3.8, 6.4)
Mie	72nd	22.7	68.1	(63.2,	71.6)	63.3	(58.7,	66.8)	4.7	(3.6, 5.9)
Shiga	73rd	22.2	66.6	(61.2,	70.3)	62.4	(57.4,	66.1)	4.1	(3.1, 5.2)
Kyoto	70th	22.6	60.4	(53.4,	65.3)	55.5	(48.6,	60.4)	4.9	(3.6, 6.3)
Osaka	70th	23.1	60.7	(52.8,	66.0)	55.9	(48.3,	61.2)	4.8	(3.3, 6.4)
Hyogo	71st	23.3	55.0	(45.7,	61.1)	51.6	(42.7,	57.7)	3.5	(2.2, 4.7)
Nara	72nd	21.9	66.6	(60.5,	70.6)	63.1	(57.3,	67.1)	3.5	(2.5, 4.6)
Wakayama	73rd	23.3	58.3	(47.4,	65.6)	55.5	(45.0,	62.6)	2.8	(1.7, 3.9)
Tottori	73rd	21.7	61.3	(53.5,	66.3)	56.5	(49.3,	61.4)	4.7	(3.4, 6.0)
Shimane	72nd	21.3	52.1	(41.7,	58.8)	48.1	(38.3,	54.7)	3.9	(2.4, 5.4)
Okayama	70th	22.8	59.7	(53.2,	64.2)	54.7	(48.4,	59.2)	5.0	(3.8, 6.3)
Hiroshima	69th	22.4	60.0	(51.8,	65.4)	55.7	(47.6,	61.1)	4.3	(3.0, 5.6)
Yamaguchi	71st	22.1	68.1	(62.8,	71.7)	63.4	(58.3,	67.3)	4.7	(3.4, 5.8)
Tokushima	72nd	23.0	62.6	(55.3,	67.8)	58.8	(51.9,	63.8)	3.8	(2.6, 5.0)
Kagawa	70th	22.7	59.6	(50.4,	65.3)	54.8	(45.9,	60.5)	4.8	(3.3, 6.2)
Ehime	73rd	23.1	67.6	(62.0,	71.2)	63.1	(57.8,	66.7)	4.5	(3.4, 5.7)
Kochi	71st	23.0	65.2	(57.0,	70.3)	62.0	(54.2,	67.0)	3.2	(2.1, 4.2)
Fukuoka	72nd	23.1	56.2	(46.9,	62.6)	52.2	(43.3,	58.7)	4.0	(2.6, 5.2)
Saga	69th	22.7	70.1	(61.5,	75.2)	66.9	(58.5,	72.0)	3.2	(2.3, 3.9)
Nagasaki	73rd	23.4	67.4	(60.0,	72.3)	64.2	(57.1,	68.9)	3.2	(2.3, 4.2)
Kumamoto	69th	23.0	55.6	(46.2,	61.7)	51.3	(42.0,	57.4)	4.3	(2.9, 5.6)
Oita	72nd	22.6	54.4	(45.1,	60.4)	50.5	(41.7,	56.4)	3.8	(2.3, 5.3)
Miyazaki	73rd	23.4	50.1	(38.7,	57.6)	47.6	(36.7,	55.0)	2.5	(1.2, 3.7)
Kagoshima	71st	23.9	62.8	(55.9,	67.4)	58.0	(51.3,	62.6)	4.8	(3.4, 6.1)
Okinawa	99th	30.0	41.5	(-0.3,	60.1)	41.8	(-0.2,	60.8)	-0.3	(-1.1, 0.3)
Total	72nd		65.3	(60.4,	68.2)	61.2	(56.4,	64.1)	4.1	(2.8, 5.3)

Table S9. Sensitivity analysis using exposure-response curves calculated with uniform daily outcome counts within each week: Heat-related, cold-related, and net excess morbidity in diarrhea (%) with 95% empirical confidence interval (eCI) by period under four climate change scenarios (RCP2.6, RCP4.5, RCP6.0, and RCP8.5) in Japan. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017). Estimates are presented as GCM-ensemble average decadal fractions. GCM=general circulation model; RCP=representative concentration pathway.

Scenario	Effect	Period					
		2010–2019		2050–2059		2090–2099	
RCP2.6	Heat	5.1	(3.8, 6.4)	5.9	(4.4, 7.7)	5.7	(4.1, 7.1)
	Cold	58.5	(54.6, 61.5)	56.8	(52.6, 60.1)	57.7	(53.8, 61.0)
	Net	-		-0.9	(-2.0, -0.1)	-0.2	(-1.5, 0.7)
RCP4.5	Heat	4.9	(3.7, 6.0)	6.4	(4.8, 7.8)	7.0	(5.2, 8.6)
	Cold	58.6	(54.7, 61.7)	56.0	(51.9, 59.2)	54.3	(49.6, 58.5)
	Net	-		-1.2	(-3.0, 0.4)	-2.3	(-4.5, -0.3)
RCP6.0	Heat	4.9	(3.7, 6.0)	6.2	(4.6, 7.8)	7.8	(5.8, 9.7)
	Cold	58.6	(54.6, 61.7)	56.4	(52.0, 59.9)	52.4	(46.9, 57.7)
	Net	-		-0.9	(-2.6, 0.5)	-3.3	(-6.6, 0.5)
RCP8.5	Heat	5.1	(3.8, 6.4)	7.0	(5.3, 8.5)	9.6	(6.4, 12.1)
	Cold	58.5	(54.5, 61.5)	54.1	(49.5, 57.5)	47.6	(41.9, 53.9)
	Net	-		-2.5	(-4.5, -1.2)	-6.4	(-11.2, -2.7)

Table S10. Sensitivity analysis with exposure-response curves calculated using weekly data, and a) calibrating the projected time series of daily mean temperature using the observed distribution of daily mean temperature, and b) projecting the time series of daily outcome using uniform distribution of events within a week: Heat-related, cold-related, and net excess morbidity in diarrhea (%) with 95% empirical confidence interval (eCI) by period under four climate change scenarios (RCP2.6, RCP4.5, RCP6.0, and RCP8.5) in Japan. Heat-related and cold-related morbidity were estimated using a two-stage time series regression model with quasi-Poisson family (Gasparrini et al. 2017). Estimates are presented as GCM-ensemble average decadal fractions. GCM=general circulation model; RCP=representative concentration pathway.

Scenario	Effect	Period					
		2010–2019		2050–2059		2090–2099	
RCP2.6	Heat	4.1	(2.9, 5.3)	5.0	(3.5, 6.9)	4.7	(3.2, 6.1)
	Cold	61.2	(56.3, 64.0)	59.1	(54.1, 62.7)	60.0	(55.2, 63.4)
	Net	-		-1.2	(-2.2, -0.2)	-0.5	(-1.9, 0.8)
RCP4.5	Heat	3.9	(2.7, 4.9)	5.4	(3.9, 6.9)	6.0	(4.2, 7.7)
	Cold	61.3	(56.5, 64.2)	58.1	(53.2, 61.4)	56.3	(50.8, 60.7)
	Net	-		-1.7	(-3.4, -0.3)	-2.8	(-4.8, -0.7)
RCP6.0	Heat	3.9	(2.7, 4.9)	5.1	(3.6, 6.7)	7.0	(5.0, 9.3)
	Cold	61.4	(56.6, 64.3)	58.6	(53.3, 62.2)	54.3	(48.1, 59.8)
	Net	-		-1.6	(-3.3, -0.2)	-4.0	(-7.0, -1.0)
RCP8.5	Heat	4.1	(2.8, 5.3)	6.1	(4.4, 7.7)	9.5	(6.2, 12.3)
	Cold	61.2	(56.4, 64.1)	56.1	(50.8, 59.7)	49.4	(42.8, 56.0)
	Net	-		-3.1	(-4.9, -1.9)	-6.5	(-9.8, -3.4)

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